2

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A J-8 TACWAR GROUND COMBAT ATTRITION PRIMER

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This paper provides an explanation and simple numerical example for the way that (conventional) attrition to ground weapon systems is determined in the current J-8 version of the TACWAR computer model of ground and air warfare. The purpose for presenting this explanation and example is to assist analyst in improving their understanding of the current ground combat attrition algorithms in J-8's TACWAR. Such increased understanding could lead to more appropriate use of the model and could facilitate decisions concerning model improvement.

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PREFACE

This paper was prepared under IDA contract MDA 903 89 C 0003 in partial fulfillment of Task Order T-I6-682, Net Assessment Methodologies and Critical Data Elements for Strategic and Theater Force Comparisons. This work was sponsored by the Capabilities Assessment Division of the Force Structure, Resource, and Assessment Directorate (J-8) of the Joint Chiefs of Staff.

This paper provides an explanation and simple numerical example for the simulation of conventional ground combat attrition in J-8's TACWAR.

The author is grateful to Dr. Robert J. Atwell, Project Leader; Dr. Peter S. Brooks; Mr. Edward P. Kerlin; Dr. Frederic A. Miercort; and Dr. Leo A. Schmidt--all of IDA--for their careful reviews of this paper.

ABSTRACT

This paper provides an explanation and simple numerical example for the way that (conventional) attrition to ground weapon systems is determined in the current J-8 version of the TACWAR computer model of ground and air warfare. The purpose for presenting this explanation and example is to assist analysts in improving their understanding of the current ground combat attrition algorithms in J-8's TACWAR. Such increased understanding could lead to more appropriate use of the model and could facilitate decisions related to model improvement.

CONTENTS

TABLES

EXECUTIVE SUMMARY

A. BACKGROUND

In 1988 and 1989, IDA developed a comprehensive structure for assessing point fire attrition in large-scale (e.g., theater-level) models. This attrition assessment structure, which is documented in IDA Paper P-2248, allowed multiple types of weapons on both sides. It did not explicitly consider multiple types of munitions, however, and it considered point fire but not area fire. The paper suggested further research to address multiple types of munitions and area fire.

The Capabilities Assessment Division (CAD) of the Force Structure, Research, and Assessment Directorate (J-8) of the Joint Chiefs of Staff sponsored additional research, which led to the publication of IDA Papers P-2249 and P-2250. These papers present a comprehensive structure for assessing both point fire and area fire attrition in theater-level models, where the attrition assessment can consider both multiple types of weapons and multiple types of munitions for the two sides in combat.

Subsequently, J-8/CAD funded the development of computer code to incorporate this attrition assessment structure into their version of TACWAR. This incorporation did not remove any existing capabilities from the model. Instead, it added as options capabilities to assess ground attrition as described in P-2249 and P-2250. The documentation of the new code is contained in IDA Document D-767, and an annotated briefing describing this code is given in IDA Document D-794.

J-8 decided not to incorporate this code into the official J-8 version of the TACWAR model. J-8 felt that its analysts did not fully understand the existing ground attrition assessment procedure in the model. Further, J-8 felt that it would be inappropriate to add new attrition assessment procedures to the model until its analysts had a better understanding of their current procedure.

J-8 asked IDA for a numeric example of the current ground attrition assessment procedure which would help its analysts understand that procedure and concomitantly help them evaluate the merits of the new attrition structures that IDA had prepared. The

goal of this paper is to present such an example and to explain the current ground attrition assessment procedure in terms of this example.

Given this goal, two issues are raised: (1) What should the form of the example be? and (2) What should be done if any errors in the code are found in the course of developing this example? These two issues are discussed in the next two sections below.

B. THE FORM OF THE EXAMPLE

In coordination with representatives from J-8, it was decided to structure the example as follows. The example would be complete and would emphasize the attrition procedure, but it would not be full-featured. That is, it would start at the beginning of Subroutine GC (ground combat) and would continue through the end of that subroutine; however, certain input switches would be set so that certain parts of the code of GC would not be exercised. For instance, the example assumes that no degradations due to supply shortages are occurring, and the relevant switches and inventories are set accordingly. The example also assumes that no degradation due to possible chemical or tactical nuclear combat is occurring, and the relevant switches and data are set accordingly.

It also was decided that the numeric example should be unclassified and relatively simple, and that no attempt should be made to make it realistic. Consequently, the goal of this paper is to produce an example that will help a reader understand the calculations and attrition mechanisms in Subroutine GC of J-8's TACWAR, not to test whether generally realistic inputs would give generally realistic outputs. Similarly, this paper does not attempt to duplicate by hand the repetitive nature of what computers can do in terms of taking many types of weapons on each side and producing page after page of numbers as outputs. Instead, the example is purposely small enough so that every calculation could reasonably be made using only pen, paper, and a hand calculator. Accordingly, a reader can trace each and every calculation as it is described here. This form of the numeric example is quite consistent with the underlying goal—to enhance understanding of the attrition procedure in Subroutine GC. This goal of achieving enhanced understanding means that the relationship between the numbers in the example and the corresponding part of the code is more important than the individual values of the numbers themselves. Thus, in addition to reporting the numeric values as calculated by GC, it is important here to explain the procedures and structures used in the attrition portion of GC.

The first chapter of the text is a brief introduction. The second chapter contains a non-numeric discussion of the logic and structure of GC with emphasis on the attrition calculations. The third chapter presents the numeric example. The individual sections of the third chapter frequently contain two subsections; the first discusses the particular logic and rationale for any nuances in the calculations, and the second gives and discusses numeric values for the calculations being made.

Thus, this paper gives more than just a numeric example of the attrition calculations in GC—it also gives a careful explanation of those calculations. However, it is not intended to be a documentation of Subroutine GC. This paper is intended to supplement such documentation by enhancing understanding of the attrition calculations of Subroutine GC.

C. PROBLEMS IN THE CODE

Unlike the form of the example, which was carefully decided upon in close coordination with representatives of J-8, the handling of problems found in the code was not considered in advance. Not surprisingly, problems were found. They ranged from what could be called stylistic nuances through errors that could significantly affect the results of the model if the section of the code containing those errors were entered in a manner that caused the errors to occur. Owing to several factors, including the goal of enhancing understanding of the current calculations, the time constraints involved, and the fact that these problems were uncovered on a piecemeal basis, the project deemed it inappropriate to divert significant effort from preparing and explaining the numeric example in order to prepare a critical review of GC. Instead, problems are discussed as part of the discussion of the code, not in a comprehensive but separate discussion.

Discussing problems in-line with explanations of the code inhibits extensive discussions of alternative corrections. Fortunately, for each problem that has the potential to be computationally significant, there seems to be at least one solution or fix which is very easy to implement. It is important to note that not all of these quick and easy-to-implement solutions are necessarily the best solutions, but each possible problem has at least one easy-to-implement solution that could be used.

I. INTRODUCTION

Each version of TACWAR is a FORTRAN computer program intended to model ground and air combat throughout a theater of warfare, where this combat can include conventional, tactical nuclear, and chemical combat. Conventional ground combat in the model is (currently) modeled by its Subroutine GC. The primary purpose of this paper is to explain how Subroutine GC determines attrition to ground weapons systems in the current J-8 version of TACWAR. A listing of the current J-8 version of Subroutine GC is given in the Appendix and is used to discuss the subroutine in detail below.

Some introductory notes may facilitate the reading of this paper. First, the explanations in the body of this paper apply to the current J-8 version of TACWAR, not necessarily to previous versions or to any IDA version of TACWAR.[1] Second, the explanations here concern only Subroutine GC; no other part of the model is discussed. Third, future expansion of the model might also allow modeling conventional ground combat using Subroutine GC90 instead of Subroutine GC; the explanations here apply to GC, not to GC90. Fourth, the fact that Subroutine GC is being described here does not imply that the use of Subroutine GC is being recommended. See References [1], [2], and [3] for further discussion of the relationship between Subroutine GC and Subroutine GC90. Fifth, the model simulates combat as occurring over multiple time periods (or, equivalently, cycles) where the number of time periods to be simulated, NCYCLE, is an input. Currently Subroutine GC is called exactly once for each time period simulated by Program TACWAR, which is the (main) program of J-8's TACWAR model. This structure should be kept in mind when reading the explanations below. Sixth, somewhat

[1] NOTICE: Throughout this paper, the words "current" and "currently," when applied to J-8's TACWAR or to any part of the TACWAR code, mean "current as of September 18, 1990." Clearly, the code can be changed over time. In particular, it is likely and quite reasonable that, as this paper is being reviewed and prepared for publication, the model will be changed to address at least some of the problems described herein. Indeed, this paper urges that these errors be addressed immediately. Modification should not be deferred until this paper is fully reviewed and published. Recognizing that the process of correcting errors may be incomplete by the time this paper is fully reviewed and published, and that code changes in the meantime may introduce new errors, this paper identifies errors in relation to the code in the Appendix so that a potential user of the model can compare the code being considered for use with the code in the Appendix to see which errors have been addressed, how they were addressed, which errors remain, and which parts of the code differ and so should be checked for other (though perhaps related) errors.

short English-language definitions of all input variables and arrays and of selected working variables and arrays are given in References [4] and [5], respectively, and it may be useful to have a copy of these references available when reading the explanations below.

The approach taken below may be summarized as follows. First, while all of the code of GC is described in general, only selected portions of it are discussed in detail. For example, it is assumed here that combat is to be simulated as if both sides had adequate supplies (i.e., the input value for ISEFFD is assumed to be 3). Thus, the portions of the code of GC that deal with supply shortages are generally summarized by simply pointing out this fact. The reader interested in obtaining a full understanding of GC, including supply shortages, could use the description here to obtain a basic understanding of GC, and then could examine the code (or ask experienced analysts) for more information.

Second, the operations of GC are illustrated using a simple numeric example. As just noted, this example assumes that no degradations due to supply shortages are occurring (ISEFFD = 3). Other simplifying features of the example are as follows:

- Only two different types of ground weapons on each side are represented (NW(L) = 2).
- Only nonpreferred munitions are represented (ISMUS(L) = 0 and NSM(L) = 0).
- Only one type of aircraft carrying only one type of air-to-ground munition is represented (NAC(L) = NAM(L) = 1).
- No surface-to-surface missile systems are represented (NSSM(L) = NMM(L) = 0).
- Only one sector of combat is represented (NS = 1).
- Posture and terrain considerations are greatly simplified.
- Multidivisional considerations and considerations concerning distances from the front and weapons being allowed on the front are greatly simplified.
- No degradation due to possible chemical or tactical nuclear combat is considered (IOMU = 5).

A full set of numeric calculations is given, however, for those aspects of GC that are considered. That is, sample (but entirely hypothetical) numeric values for all of the required inputs are postulated, and the resulting numeric values of all major working

variables and arrays are given. Interested readers could consider this numeric example as a base upon which to build a better understanding of J-8's TACWAR.

Finally, while the results that would be obtained under several different options are described, only some (not all) possible options are considered. For example, the discussion describes neither the calculations and results for options invoked by setting the value of the input variable MVCASO to 2 or 3 nor the impact on the output of various print options.

The discussion of Subroutine GC is organized as follows. Chapter II subdivides the code of Subroutine GC (given in the Appendix) into parts and sections and discusses the logic of those parts and sections, but it does not discuss the numeric example. Chapter III presents the numeric example in terms of relevant variables and arrays according to those parts and sections. Accordingly, a reader may occasionally (or regularly) want to skip back and forth among the corresponding parts and sections of Chapters II and III, the code in the Appendix, and the definitions of variables and arrays given in [4] and [5].

II. DISCUSSION OF SUBROUTINE GC

Subroutine GC is relatively long. The code of GC listed in the Appendix consists of 2,393 statement lines (of which 166 are continuation lines) and 925 comment lines (of which 252 are essentially blank, and well over one third of the remaining 673 comment lines are "commented-out dead code" which should be removed). Thus, in total, that code is 3,318 lines long (counting each included file as only one line, and counting all of the comment lines, meaningful or not). As the line numbers in the Appendix indicate, if the lines in the included files are also counted, GC is 4,783 lines long (i.e., there are 1,465 lines in those included files).

One way to discuss long code is to divide it into sections and to organize the discussion according to those sections—this is done here. There are many very different ways to subdivide the GC code, and no one way is inherently superior to all others for all purposes. For the purposes here, the code of GC in the Appendix is subdivided into 10 parts (labeled from Part A through Part J), which in turn are subdivided into two or more sections for a total (over all parts) of 48 sections. These subdivisions are defined using the line numbers listed in the Appendix, and the particular line numbers that bound these subdivisions are given on Table II-1.

A. PART A (LINES 1-1762)

Subroutine GC is called by Program TACWAR once for each time period (i.e., cycle) being simulated. Most of the code of GC is contained inside a very long do-loop over sectors (Parts B through I comprise this do-loop). Part A consists of the code from the first line of GC up to the start of this do-loop.

1. Section 1 (Lines 1-1613)

Section 1 consists of the subroutine statement, the specification statements (many of which are in the included files), and some (initial) comment lines. This "front matter" is generally necessary but not particularly informative for an introductory look at GC.

Table II-1. A Subdivision of Subroutine GC Into Parts and Sections

Part	Lines	Code Section	Lines	Text Section
A	0001-1762	1	0001-1613	A1
		2	1614-1665	A2
		3	1666-1740	A3
		4	1741-1762	A4
B	1763-1941	5	1763-1806	B1
		6	1807-1896	B2
		7	1897-1941	B3
C	1942-3040	8	1942-1945	C1
		9	1946-1992	C2
		10	1993-2010	C3
		11	2011-2132	C4
		12	2133-2166	C5
		13	2167-2210	C6
		14	2211-2293	C7
		15	2294-2542	C8
		16	2543-2577	C9
		17	2278-2638	C10
		18	2639-2697	C11
		19	2698-2911	C12
		20	2912-3017	C13
		21	3018-3040	C14
D	3041-3249	22	3041-3115	D1
		23	3116-3249	D2
E	3250-3942	24	3250-3397	E1
		25	3398-3605	E2
		26	3606-3640	E3
		27	3641-3771	E4
		28	3772-3803	E5
		29	3804-3891	E6
		30	3892-3942	E7
F	3943-4168	31	3943-3953	F1
		32	3954-4075	F2
		33	4076-4168	F3
G	4169-4239	34	4169-4210	G1
		35	4211-4239	G2
H	4240-4328	36	4240-4309	H1
		37	4310-4328	H2
I	4329-4598	38	4329-4358	I1
		39	4359-4370	I2
		40	4371-4426	I3
		41	4427-4501	I4
		42	4502-4565	I5
		43	4566-4598	I6
J	4599-4783	44	4599-4607	J1
		45	4608-4673	J2
		46	4674-4702	J3
		47	4703-4723	J4
		48	4724-4783	J5

Sections 2, 3, and 4 consist of the executable statements and related comment lines between the specification statements and the start of the huge do-loop over sectors mentioned above. Some of the calculations made here are important for a first look at GC; others are not.

2. Section 2 (Lines 1614-1665)

Lines 1614 through 1630 concern which side is labeled as being the probable sector attacker. Some problems here are as follows. The statement on line 1620 is wrong (instead, L should be set equal to ISAT(ISA(IS),IS)), and the use of ICSA on line 1621 is inconsistent with its use elsewhere in the code—and these uses are generally inconsistent with reasonable interpretations of the definition of ICSA in Reference [4]. For the purposes here, assume that Side 1 is the probable sector attacker and also will (in Section 27) be declared to be the "actual" sector attacker, and assume that the posture in Sector 1 for the initial value of FEBA(1) is posture type 1.

Lines 1631 through 1640 concern printing outputs.

Lines 1641 through 1665 concern surface-to-surface missile systems (SSMs). For the purposes here, assume that no SSMs are involved on either side.

3. Section 3 (Lines 1666-1740)

From a sufficiently abstract point-of-view, the ground combat attrition structure is quite simple: it allocates fire to targets by type of target, it calculates attrition due to this fire, and then it (optionally) scales this calculated attrition. Lines 1666 through 1740 concern (a portion of) the calculation of the allocation of fire.

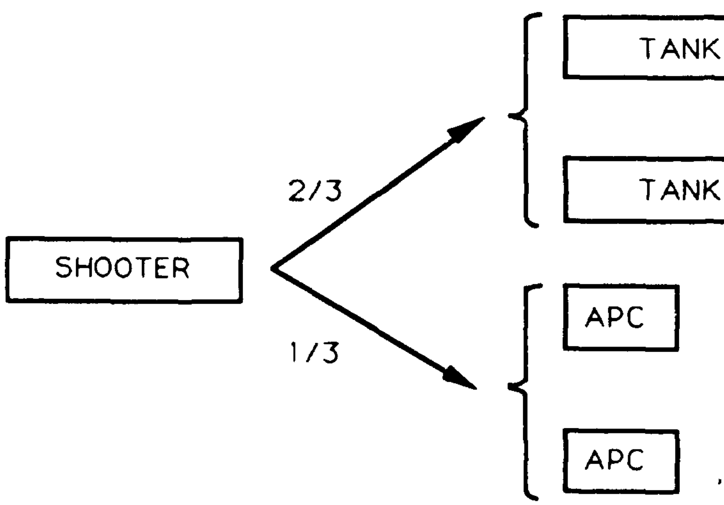
The basic logic is as follows. Suppose, for example, that anti-armor weapons generally prefer to shoot at enemy tanks but sometimes may shoot at armored personnel carriers (APCs) because —

- Occasionally one or more APCs may be between any engageable tank and the shooting weapon in question.
- An APC may be imminently threatening that shooting weapon (or another weapon on its side).
- The shooting weapon may have a "safe" shot against an APC, but (moving and) shooting at a tank would expose it to enemy fire.

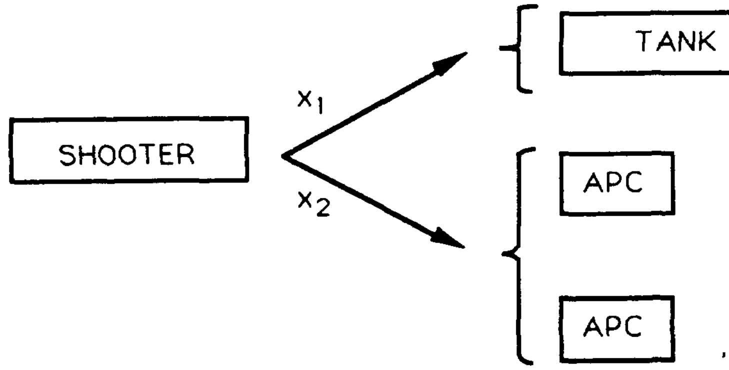
- The relative locations and orientations are such that the shooting weapon may have a much better shot at an APC than it has at any tank.
- The particular tactical situation may (temporarily) make an APC a much more valuable target than the tanks that are present—e.g., the APC is occupying an important piece of terrain, or the APC is full of fresh troops and supplies.

In addition, while it is the case that if the enemy force were to consist of almost all tanks and almost no APCs, then almost all fire would be directed against tanks; it also must be the case that if the enemy force consisted of almost all APCs and almost no tanks, then almost all fire would be directed against APCs.

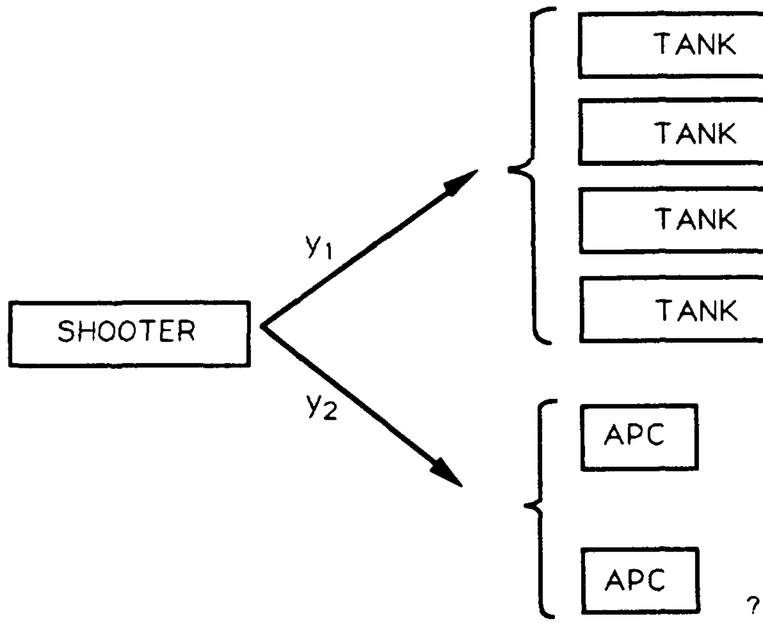
To construct a simple example, suppose that a certain type of shooting weapon generally prefers to fire at tanks, but occasionally will fire at APCs. Suppose also that the allocation of fire of the shooters against these two types of targets varies as the relative numbers of these two types vary. In particular, suppose it is known that if 2 enemy tanks and 2 enemy APCs were present, then a shooting weapon of that type would, on average, make two-thirds of its engagements against tanks and one-third of its engagements against APCs. Given this knowledge, what should the model estimate the allocation of fire to be if 1 enemy tank and 2 enemy APCs are present, and what should this estimate be if 4 enemy tanks and 2 enemy APCs are present? A graphic representation of this example appears below.



then what should x_1 and x_2 be for



and what should y_1 and y_2 be for



Obviously, there is no single correct answer to this question that covers all special cases; but reasonable (on average) values would appear to be as follows:

$$x_1 = 1/2$$

$$x_2 = 1/2,$$

and

$$y_1 = 4/5$$

$$y_2 = 1/5.$$

That is, if a shooter is twice as likely to shoot at tanks than at APCs when they are present in equal numbers, then that shooter is equally likely to shoot at tanks as at APCs when there are twice as many APCs as there are tanks present, and it is four times as likely to

shoot at tanks than at APCs when there are twice as many tanks as there are APCs present.

Detailed discussions of various aspects of this method for determining allocation of fire can be found in several references: [6, Chapter II], [7, pages 98 through 100], [8, pages 31 and 32], [9, pages 42 and 43, and 53 and 54], [10, pages 4 through 8], and [11, pages III-1 through III-9].

Basically, however, this allocation-of-fire method only does the following. It takes as input some typical allocation against some typical force, and then computes a particular allocation against the particular force present in a manner that is consistent with those inputs and with the following property: the more heavily represented any type of weapon is in a force, the more fire that type of weapon will draw (in total, not per weapon of that type present), and vice versa.

This calculation of allocation-of fire can be divided into two steps. In the first step, the input allocation against the input typical force is converted to a per-target-weapon allocation (i.e., the allocation that would "theoretically" apply if there were one weapon of each type present in the target force). The second step converts the per-target-weapon allocation into the allocation to be used against the particular force in question. This two-step approach is unnecessary, but it is embedded in J-8's TACWAR code in that lines 1666 through 1740 address this first step (for nonpreferred munitions), while the second step is considered much later in the code (e.g., for ground weapons, on lines 2141 through 2165 in Step 10).

4. Section 4 (Lines 1741-1762)

Lines 1741 through 1752 simply initialize some arrays that involve sums of data over all sectors, and so must be initialized before the sector loop.

Lines 1753 through 1755 concern lines 1764 through 1779 in code Section 5 (Part B)—they have nothing to do with the executable code in Part A.

There are several arguments against giving the input MVCASO a value of zero, as discussed in References [2] and [12]. Lines 1756 through 1762 provide another reason why MVCASO should not be zero. In particular, MVCASO = 0 scales simulated attrition using a force ratio. For interdiction, there is no force ratio. Instead, the model uses unweighted averages of essentially arbitrary combat data to generate scale factors for

interdiction. These lines are used to generate a scaling factor even if no combat is occurring.

B. Part B (Lines 1763-1941)

As noted above, much of GC is contained in a huge do-loop over sectors. From a broad perspective, for each sector this loop *(a)* calculates kill-rate matrices, *(b)* calculates weapons systems scores, *(c)* simulates attrition, *(d)* optionally scales that simulated attrition, and *(e)* assesses the (optionally scaled) attrition. From a slightly narrower perspective, this loop can be further subdivided, and Parts B through I form a slightly finer subdivision of this loop. In particular, Part B performs some initial calculations for the sector in question, then Part C, which consists entirely of a long do-loop over side, computes kill-rate matrices based on various inputs and on the results of the initial calculations. Accordingly, Part B runs from the start of the huge do-loop over sectors to the start of the long do-through-1050 loop over side.

1. Section 5 (Lines 1763-1806)

Line 1763 starts this (very) long do-loop over side.

Lines 1764 through 1779 set IHOLD(L) and IDRAW(IS,L) to 0, and then can reset them if the index to nuclear combat mode ICMST(IS,L) is not zero. The example in Chapter III assumes that ICMST(IS,L) is zero. However, note that lines 1771 and 1773 appear to be wrong, causing this code to produce erroneous results if ICMST(IS,L) is not zero. Lines 1780 through 1786 write IHOLD and IDRAW to an output file.

With one exception, lines 1787 through 1802 are comment lines—line 1797 sets the index of terrain type KTI. See Point (7) of (text) Section 2, below, for a discussion of an apparently significant error related to line 1797.

Line 1803 selects a side to be the proposed sector attacker. Roughly speaking, the proposed sector attacker is given first choice as to whether it wants to attack or not, and it is required to attack (even if it doesn't want to) if the other side (also) doesn't want to attack.

Lines 1804 through 1806 use the array ICSA(IS) to make a potentially important assumption concerning posture under a particular set of conditions. (Some aspects of the way that the model considers posture will be discussed further below.) For the purposes

here, assume that these conditions are not occurring—in particular, assume that ICSA(IS) = 1.

These calculations, including the determination of which side is to be the sector attacker, can have a major impact on the results of the model (in general) and of GC (in particular). The impact on GC is largely in terms of determining which data are to be used in the attrition calculations, not in determining how the calculations are made given the data. Thus, while it is necessary to understand these calculations in order to understand TACWAR, it is not necessary to understand them in order to understand the details of the simulation of attrition in GC.

2. Section 6 (Lines 1807-1896)

The primary goal of Section 6 is to subdivide the ground weapons in the sector into two groups: (1) those with the capability both to engage some enemy ground weapons and to be engaged by some enemy ground weapons, and (2) those that can neither engage enemy ground weapons nor be engaged by enemy ground weapons. All of these ground weapons can be engaged by enemy aircraft and SSMs and, in GC, none of these ground weapons can engage enemy aircraft and SSMs. As shown in the following tabulation, the number of ground weapons that can engage only "vulnerable" enemy ground weapons but are vulnerable to both enemy air and ground weapons is computed as WSI (IW, IS, L), and the number of ground weapons that cannot engage any enemy ground weapons but are vulnerable to enemy air weapons is calculated as WS (IW, L) minus WSI (IW, IS, L). The total number of ground weapons of type IW on side L considered, WS (IW, L), is an implicit function of IS in the code.

Capability of Ground Weapons as Shooters	Vulnerability of Ground Weapons as Targets			
	Vulnerable to enemy air and ground weapons	Vulnerable only to enemy air weapons	Not Vulnerable	Total
Can engage all enemy ground weapons	nc	nc	nc	nc
Can engage only "vulnerable" enemy ground weapons	WSI	nc	nc	WSI
Cannot engage any enemy ground weapons	nc	WS *minus* WSI	nc	WS *minus* WSI
TOTAL	WSI	WS *minus* WSI	nc	WS

nc = not computed

3. Section 7 (Lines 1897-1941)

Section 7 sets some initial values for working arrays prior to the upcoming do-loop over side which constitutes Part C. After initializing these arrays, it skips to the end of the do-loop over sector if there are no ground weapons present on one or the other (or both) of the sides (line 1930). It also skips to the start of Section 15 if MVCASO = 2 and ICYCLE > 1; however, note that MVCASO = 2 causes allocations of fire to be determined by forces that are not there (see Reference [12] for details).

C. PART C (LINES 1942-3040)

Part C consists of the long do-loop over side that starts at line 1942 and ends at line 3040. Because this loop is so large, it is divided into 14 sections for the discussion here. The main purpose of this loop is to calculate the kill rate matrices PWAKW(IW,JW,L) and PWDKW(IW,JW,L), which is done in Section 18 (lines 2639-2997). These rates can be adjusted (for artillery and helicopters) in Section 21 (lines 3018-3040).

1. Section 8 (Lines 1942-1945)

Line 1942 starts the do-loop over side, where L denotes the side in question. Line 1943 sets II to denote the other side. Lines 1944 and 1945 could be deleted, and the inputs NW(L) and NW(II) could be used directly where needed.

2. Section 9 (Lines 1946-1992)

This section concerns only the possible use of preferred munitions, a detailed discussion of which is beyond the intended purposes of this paper.

3. Section 10 (Lines 1993-2010)

This section's sole purpose is to set posture indices.

4. Section 11 (Lines 2011-2132)

This section consists entirely of the implementation of a really bad idea. Basically, this idea is to input allocations of fire by groups of types of weapons instead of just by types of weapons. This approach is inefficient in that it requires extra code (e.g., this section), it requires extra inputs (the grouping structure must be input as well as the assignment of types to groups), it requires extra running time (e.g., to run this section), it requires extra storage space (both the input allocations by group and the resulting allocations by type must be stored), it limits flexibility (if two different types of weapons are in the same group, one cannot be preferentially engaged over the other), and it adds no additional capabilities (anything that can be done by weapon groups can also and more easily be done by weapon types). All it does is to add an unnecessary layer of complexity which impedes understanding the allocation process. This section of code should be eliminated. But in the meantime, the input LNKWPT should be set so that LNKWPT(IW,L) = IW for all IW and both L. If this is done, then PWIC is always equal to 1.0, and this section of the code does nothing but set each element of the arrays SAWA, SAWD, BBFRASM, BBFRDSM, RRFRASM, RRFRDSM, SSAWA, SSAWD, SSAWWA, and SSAMMD equal to the corresponding element in BSAWA, BSAWD, RSAWA, RSAWD, BFRASM, BFRDSM, RFRASM, RFRDSM, SAMA, SAMD, and SAMMA, and SAMMD.

5. Section 12 (Lines 2133-2166)

Lines 2133 to 2140 (and 2166) concern the option to set MVCASO = 3. This option, like MVCASO = 2, causes allocations of fire to be specified by forces which are not there.

Lines 2141 through 2165 complete the allocation of fire computations for ground weapons started on lines 1666 through 1716 of Section 3. At this point in the code (i.e., at line 2165), AAWA(JW,IW,II) gives the allocation of fire of ground weapons of type

JW on Side II over all types of munitions if Side II is to be the attacker (and AAWD is the same for Side II on defense). Later (in Section 16), the fraction of the engagements against enemy weapons of type IW that are made using preferred munitions are subtracted from AAWA and AAWD; so after that section, AAWA(JW,IW,II) and AAWD(JW,IW,II) give the fraction of the engagements made by ground weapons of type JW on side II that are made against enemy weapons of type IW using nonpreferred munitions.

6. Section 13 (Lines 2167-2210)

This section does nothing but set the elements of the arrays EERTA and EERTD equal to the corresponding elements of the input arrays ERTA and ERTD. Since EERTA and EERTD are then used without modification, this code should be deleted and (instead) ERTA and ERTD should be used throughout. Note that line 2170 is a comment line (not a statement line) that serves no purpose, as are lines 2177 through 2210. These comment lines (i.e., all of this "dead code") could be deleted.

7. Section 14 (Lines 2211-2293)

Like Section 9 (Lines 1946-1992), this section concerns only the possible use of preferred munitions, a detailed discussion of which is beyond the intended purposes of this paper.

8. Section 15 (Lines 2294-2542)

This section consists of nothing but "dead code," which could be deleted.

9. Section 16 (Lines 2543-2577)

While the details of the simulation of preferred munitions are beyond the intended purposes here, one general point may be worth noting. Looking at Subroutine GC, one might ask what the important differences are between the way it simulates preferred munitions and the way it simulates nonpreferred munitions. It appears that there are none. That is, while the data entered could be significantly different, and while there are some differences in the code concerning the type of data that can be entered and the way that the data are used, these code differences between the treatment of preferred munitions and the treatment of nonpreferred munitions seem to be quite minor.

Given the basic equivalence of this code, a significant simplification can be achieved by essentially deleting all coding distinctions between preferred munitions and nonpreferred munitions, and (instead) just simulating multiple types of munitions for each type of ground weapon. This can be done relatively easily, for example, by incrementing the value of NSM(L) by one (i.e., NSM(L) ← NSM(L) + 1) for both L, then playing the first (new) type of munition as nonpreferred munitions and playing the i^{th} (new) type of munition using the same stockage levels and effectiveness parameters as the i-minus-1^{st} (old) type of preferred munition for i = 2 through one plus the old value of NSM(L) for both L. For example:

New Data		Old Data
NSM(L)	←	NSM(L)+1
BPKASM(IW,JW,ISM+1)	←	BPKASM(IW,JW,ISM)
BPKASM(IW,JW,1)	←	BPKAW(IW,JW,1)
BFRASM(IW,JW,ISM+1)	←	BFRASM(IW,JW,ISM)
BFRASM(IW,JW,1)	←	$1.0 - \sum_{ISM=1}^{NSM(L)} BFRASM(IW,JW,ISM)$.

One of the simplifications that would result from this conversion is that all of Section 16 would be deleted.

10. Section 17 (Lines 2578-2638)

As discussed in References [2], [11], [13], and [14], three fundamental parameters concerning the calculation of attrition for (one-sided) heterogeneous point fire are: *(1)* the engagement rates of the various types of shooters, *(2)* the allocation of fire of various types of shooters against the various types of targets, and *(3)* the probability of kill of the various types of targets by the various types of shooters. Of the many attrition formulas presented in those references, exactly one (Lanchester) has the property that engagement rates and probabilities of kill always appear as factors of each other. This one attrition formula is the only one used in GC to compute (simulated) losses, and these lines calculate the products of these factors.

11. Section 18 (Lines 2639-2697)

Not only are the Lanchester formulas the only ones in which engagement rates and probabilities of kill always appear as factors of each other, these formulas are the only ones that have the property that all three parameters (engagement rates, probabilities of kill, and allocations of fire) always appear as factors of each other. Accordingly, this section multiplies the third factor (allocation of fire) by the product of the other two (as computed in Section 10) to give the overall product (i.e., the kill rate) for each "class/type" of munition. Summing the kill rate for the one generic type of nonpreferred munition with the kill rates for each of the preferred types of munitions gives the per-shooter kill rate (over all of the types of munitions being used) for each type of shooter against each type of target. With one class of exceptions (discussed in Section 21), these overall kill rates are calculated at the end of Section 18.

It should be noted that computing kill rates as the product of these three factors is not the only (or even the best) way to do so. See References [3] and [15] for discussions of other methods and for general recommendations.

12. Section 19 (Lines 2698-2911)

This section only writes selected results to output files, if desired. It performs no substantive calculations.

13. Section 20 (Lines 2912-3017)

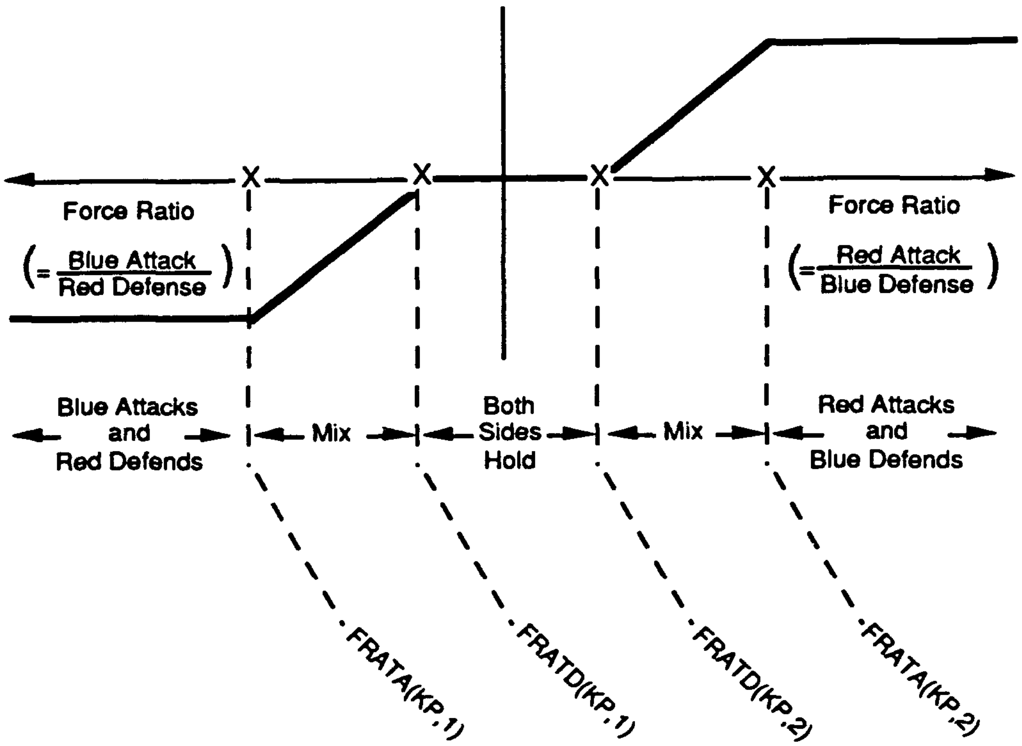
This section performs some relatively simple calculations and raises some potentially important issues.

The computations are almost straightforward. The reason for the "almost" is that calculations made in Section 20 assume that ISAT(ISA(IS),IS) gives the side on attack in the sector. In general, however, ISAT gives the side that last attacked in that sector and that therefore will likely, but not necessarily, be the side that will attack during the current time period. Since ISAT does not necessarily give the side that will attack, this code could be wrong. In addition to occurring here, this potential problem occurs on lines 1804, 1814, 2004, 2924, 3094, and 3282, and the corresponding problem concerning ISA(IS) definitely occurs on lines 1620, 3924, and 4280, and appears to also occur on lines 1768, 1771, and 3743.

Because the input data determine whether this problem will occur and how seriously it will affect results, its impact cannot be stated absolutely. First, in every run made so far, Side 2 could have always been attacking in all of the sectors. Given that assumption, this coding problem would not yet have had any affect on the results, but every future run could be subject to this problem until it was corrected or the data were restricted to prevent this problem from affecting the results. Second, the data used could have been such that, while this problem could have occurred, it would not have had any effect on the results. While theoretically possible, this scenario probably is not what has happened. Third, perhaps this problem has occurred here, and the error has affected some (but not all) of the results, but none of the results it affected have been that important. Fourth, perhaps this problem has occurred and the resultant error has affected important results. Note that there are, in a sense, two ways in which this problem could occur. Either (1) the sector attacker could change from Side 2 to Side 1, or (2) the sector attacker could change from wanting to attack and being allowed to do so by the code to wanting to hold but being forced to use attack parameters by the code. In the latter case, as long as the other side never became the sector attacker, the degree of the error from this problem would depend on how well a holding posture is modeled—and it is argued here that J-8's TACWAR models such a posture quite poorly (see, for example, Section B.1, above, and Reference [3]).

Several fixes are possible. One such fix can be obtained by changing the input data while keeping the current coding. For each input that applies when the side in question is on attack, there is a corresponding input that applies when the side in question is on defense. Thus, this fix would be to set the values of each attack-defense input pair equal to each other, thereby precluding the perception that the model always plays separate effectiveness parameters for attack and defense.

Several other fixes are possible, but a good code fix would also fix the "one more rifle turns the sector attacker into the sector defender" problem. One such fix, which would also accommodate holding postures, could be based on the picture below:



In this case, the inputs must satisfy

FRATA(KP,L) > FRATD(KP,L)

for all KP and L, and there would need to be a "hard" stop in the code if both

FRAD(Blue-Attack/Red-Defense) > FRATD(KP,1)

and

FRAD(Red-Attack/Blue-Defense) > FRATD(KP,2)

at the same time in the same sector. With this approach, the arrays ISAP(IS) and ICSA(IS) should be deleted, and the array ISA(IS) should be defined as follows for sector IS:

$$
\mathrm{ISA(IS)} = \begin{cases} -1 & \text{if the attacking side has not yet been determined} \\ 0 & \text{if a holding posture exists} \\ 1 & \text{if a mixture of holding and Side 1 attacking exists} \\ 2 & \text{if a mixture of holding and Side 2 attacking exists} \\ 3 & \text{if Side 1 is the attacker throughout the cycle} \\ 4 & \text{if Side 2 is the attacker throughout the cycle.} \end{cases}
$$

Data for holding could be new inputs or, more simply and reasonably, could be the set equal to the corresponding data for defense, except for ERTD—holding postures would use ERTD(IW,6,L) in place of ERTD(IW,KP,L) no matter what KPS(IS) was.

This is one suggestion—there are several other relatively simple and straightforward methods to consider effectiveness parameters that are functions of attack and defense, that do not involve step functions, and that have relatively modest data requirements. J-8's TACWAR currently does not use such a method. Some thoughts concerning this observation are given in Reference [3]. Note that, while Reference [3] considers both the J-8 version and the IDA version of TACWAR, the comments above necessarily apply only to the J-8 version of TACWAR. These versions differ considerably concerning their treatment of sector attacker and posture. As a rough measure of their differences, the following table compares the number of times that they define and use variables and arrays to denote sector attacker and posture:

J-8 Variable or Array Element	Also IDA ?	J-8 Type	J-8 Common Block	Number of Lines Where: Value Is Set J-8	Value Is Set IDA	Other Appearances J-8	Other Appearances IDA
Index for Sector Attacker:							
ISA(IS)	Yes	Input	BLANKRS	24	12	13	19
ISATT	No	Working	(local)	4	–	31	–
ISAP(IS)	No	Working	GCFM	1	–	2	–
			Totals	29	12	46	19
Kind of Posture:							
KP	Yes	Working	(local)	7	4	19	20
KPA	No	Working	(local)	2	–	9	–
KPCAS	No	Working	(local)	2	–	10	–
KPD	No	Working	(local)	2	–	11	–
KPI	No	Working	(local)	3	–	2	–
KPS(IS)	Yes	Working	BLANKRS	5	4	8	4
			Totals	21	4	59	24
Other Related Array:							
ICSA(IS)	No	Input	BLANK	3	–	4	–

Note that if ISA(IS) is defined as in the discussion here, it will no longer contain (embedded) information pertaining to issues unrelated to GC, which should be accounted for in separate arrays. For example, it would no longer contain information concerning whether Blue or Red was constrained by front-to-flank ratios, or whether Blue was attacking (after first defending) and had reached but not been allowed to cross the (time

zero) initial FEBA position, or the nuclear combat mode. Simplifying the definition of ISA might help eliminate the types of errors discussed here in that these errors may have resulted in part because the current definition of ISA(IS) is relatively complex.

14. Section 21 (Lines 3018-3040)

Lines 3018 through 3039 apply FRRINA and FRRINH to PWAKW and PWDKW.

Line 3040 ends the loop over side started on line 1942 at the beginning of Part C and, therefore, ends Part C.

D. PART D (LINES 3041-3249)

Part E, which follows, uses the ground-to-ground kill rate matrices, plus some results computed here, to calculate weapons system scores, force strengths, force ratios, and some related quantities. Before these can be calculated, air-to-ground and SSM kill rate matrices must be computed—and an additional calculation concerning the selection of a reference weapon may be needed. Part D calculates air-to-ground and SSM kill rate matrices, and it attempts to make an appropriate calculation concerning the selection of a reference weapon when annihilation occurs.

1. Section 22 (Lines 3041-3115)

The calculations made here concern the selection of the type of weapon designated to be the reference weapon if annihilation occurs. If no weapon types are ever annihilated, then this section has no effect on the results.

2. Section 23 (Lines 3116-3249)

This section just does for air-to-ground systems and SSMs what (code) Section 18 does for ground-to-ground systems—it multiplies engagement rates, allocations of fire, and probabilities of kill to give kill-rate matrices.

E. PART E (LINES 3250-3942)

Part E uses the kill rate matrices determined above in the antipotential potential method to compute weapons scores. A unit effectiveness factor for each unit is computed using these weapon scores and using the numbers of weapons, people, and supplies in the unit. These strengths are then used to compute which side is to be the "real" (not just

"likely") sector attacker, and to compute values for the arrays PCS(L) and VLS(L). These arrays can be used in Part F to compute personnel losses but not weapon losses, or weapon losses but not personnel losses, or both weapon losses and personnel losses, or they may not be used at all (anywhere in the model); their use depends on the values of the inputs MVCASO and IPLSC.

1. Section 24 (Lines 3250-3397)

This section uses Subroutines EIGENV and MPROD to calculate the antipotential potential scores for each type of ground weapon, aircraft sortie, and surface-to-surface missile system. If the three changes described next were made, the code here would be a clear and efficient implementation of the antipotential potential methodology described in References [11], [16], and [17]. The three changes that could be made here are as follows:

First, N3, N4, N5, N6, IADDR, BSUM(IADDR), and RSUM(IAADR) could be deleted entirely from the code, and NW(L), NAC(L), and NSSM(C) and the arrays P[W,A,M][A,D]KW(•,•,•) could be used directly instead. This will require a slight recoding of Subroutines EIGENV and MPROD.

Second, the test in Section 24 for the presence of targets for the reference weapon could be improved and moved to Section 22, and the rest of the current Section 24 could be deleted.

Third, if there are targets for the reference weapon type (either because there were targets for the original reference type or because the reference type has been changed to a type for which targets are present), then IFLAG will have a value of one in Section 24 only if serious errors (e.g., erroneous input data) exist. Accordingly, if Subroutine EIGENV returns with IFLAG = 1, a "hard" stop could be put here (after first writing appropriate reference information such as sector, cycle, and the cause of the stop).

2. Section 25 (Lines 3398-3605)

This section calculates scores for ground weapons and effectiveness measures for the divisions in combat.

3. Section 26 (Lines 3606-3640)

Given that the value (antipotential potential score) of a successfully penetrating CAS sortie by an aircraft of type IA in sector IS for side L on attack is VIAACF(IAC,IS,L) as computed in (code) Section 24, and that ACSABA(IAC,IS,L) of such sorties are flown, then the total value (score) of all of the CAS sorties for side L on attack in sector IS, VAABA(IS,L), is given by

$$\mathrm{VAABA(IS,L)} = \sum_{\mathrm{IAC}=1}^{\mathrm{NAC(L)}} \mathrm{VIAACF(IAC,IS,L)*ACSABA(IAC,IS,L)}.$$

The model makes this computation (for aircraft and SSMs) in Section 26.

4. Section 27 (Lines 3641-3771)

This section uses the force strengths of the two sides, along with certain input parameters, to determine which side is to be the "true" attacker in the sector and cycle in question. A method for making this determination is discussed above in (text) Section C.13 (which concerns code Section 20).

5. Section 28 (Lines 3772-3803)

This section concerns reduced effectiveness due to supply shortages, and so has no direct effect on the example in Chapter III (which assumes that the possibility of a shortage of supplies is not to be considered).

6. Section 29 (Lines 3804-3891)

The goals of this section are to compute PCS(L), which is used later in the code to compute (personnel) causalities if IPLSC = 0, and to compute VLS(L), which is used later in the code to scale simulated losses if MVCASO = 0.

7. Section 30 (Lines 3892-3942)

This section only concerns the consumption of supplies and related inventories, and so is not directly relevant to the example presented in Chapter III.

F. PART F (LINES 3943-4168)

Parts F, G, and H are contained inside a do-loop over side—the first executable statement of Part F starts this loop and the last of Part H ends it. Part F attempts to

compute the number of weapons of each type lost in combat on each side, Part G makes some calculations concerning the consumption of munitions, and Part H makes computations concerning the number of personnel lost in combat on each side.

1. Section 31 (Lines 3943-3953)

Lines 3943 to 3945 are comment lines. Line 3946 starts the do-loop over side (side being denoted by L) and line 3947 sets II = 3 – L. Lines 3948 to 3952 define some variables which could be deleted. Line 3953 could be moved to just after line 3957 in Section 32.

2. Section 32 (Lines 3954-4075)

This section is entered only if the input MVCASO = 0, 2, or 3—if MVCASO = 1 the code skips to Section 33, below. If entered, this section can be pictured as making four somewhat intertwined calculations. First, it calculates simulated attrition using a heterogeneous Lanchester square formula in difference equation form. See References [2], [11], and [13] for discussions of why this is not a good formula to use to compute simulated attrition. Second, this section scales the simulated attrition using the term VLS(L) computed in (code) Section 29, above. Determining weapons losses by dynamically scaling simulated attrition has several defects—these defects (and suggested alternatives to this approach) are described in References [2], [12], and [17]. Third, it artificially inflates the effects of close air support—see Reference [12] for details. Finally, it adjusts these scaled CAS-inflated Lanchesterian weapon losses if these losses, denoted at this point in the code by WLS(IW,IS,L), are greater than the number of weapons in the sector, denoted by WS(IW,L). This adjustment is erroneous, and lines 4056 through 4073 should be either fixed or replaced by a "hard" stop.

3. Section 33 (Lines 4076-4168)

This section is entered only if the input MVCASO = 1; if MVCASO = 0, 2, or 3, the code (which would have just processed Section 32, above) skips to Section 34. If entered, this section can be pictured as making three of the four calculations (that would have been) made by Section 33. In particular, this section calculates simulated attrition using a heterogeneous Lanchester square formula in difference equation form, it inflates the effects of close air support, and it adjusts these CAS-inflated Lanchesterian weapon losses if these losses, again denoted by WLS(IW,IS,L), are greater than the number of

weapons in the sector, again denoted by WS(IW,L). The calculation made by Section 32 but not Section 33 is the scaling of the simulated attrition using VLS(L). Accordingly, lines 4143 through 4166 should be either fixed or replaced by a "hard" stop.

G. PART G (LINES 4169-4239)

This part makes some calculations concerning munition consumption and it (optionally) writes some results to an output file.

1. Section 34 (Lines 4169-4210)

This section, which is entered for all values of MVCASO, scales ground munition expenditures by VFACTOR, which is the same scaling factor used to scale weapons losses if MVCASO = 0, and which is undefined if MVCASO = 1. Note that it does not scale the expenditures of air munitions or SSMs, and that no adjustments are made here if VLS(IW,IS,L) is greater than WS(IW,L).

2. Section 35 (Lines 4211-4239)

This section only writes some results to an output file—it performs no substantive calculations.

H. PART H (LINES 4240-4328)

1. Section 36 (Lines 4240-4309)

This section is entered only if the input IPLSC = 0; if IPLSC = 1, the code skips to Section 37, below. If entered, this section computes the number of casualties to unit ID (on side L in sector IS) as

PCS(L)*PDIV(ID)*FRACW,

where PCS(L) is computed in (code) Section 29, PDIV(ID) is the number of personnel in unit ID, and FRACW is a term that depends on the input DFBACT(L), on the FEBA position FEBA(IS), and on CDVLOC(ID), which is an input that, in general, is adjusted over time by the model. If FRACW = 1.0, then this method for computing casualties suffers from the weaknesses described in Reference [12]. If $0.0 \leq$ FRACW < 1.0, then this method both suffers from these weakness and produces questionable results if any artillery, helicopters, and/or AAA are within ERGMAX(IW,L) of the FEBA for corresponding values of IW. If FRACW > 1.0 or FRACW < 0.0, the method is incorrect.

2. Section 37 (Lines 4310-4328)

This section is entered only if the input IPLSC = 1; if IPLSCO = 0, the code (which would have just processed Section 36, above) skips to Section 38. If entered, this section, combined with Section 39 (lines 4359-4370), computes personnel losses to side L by summing (over all weapon types, IW) the product of the number of weapons of type IW times the input factor FTCWPL(IW,L). The last line of this section ends the do-loop over side started at the beginning of Part F.

I. PART I (LINES 4329-4598)

Parts F, G, and H (combined with Section 34, if IPLSC = 1) will have calculated the number of weapons lost by type and number of people lost on each side in the sector and cycle in question. Part I assesses these losses to the units on each side and attempts to make several other miscellaneous calculations involving attrition before ending the huge do-loop over sector started at the beginning of Part B.

1. Section 38 (Lines 4329-4358)

As noted above, this section should be merged with Section 40 by moving Section 39 (which currently separates them) to Part H. Taken together, Sections 38 and 40 assess the personnel and weapon losses computed in Parts F and H to the units involved.

2. Section 39 (Lines 4359-4370)

This code is logically part of (code) Section 37.

3. Section 40 (Lines 4371-4426)

This section is logically part of Section 38 above and could be merged with that section if lines 4359 through 4370 are moved to Section 37.

4. Section 41 (Lines 4427-4501)

This section performs some calculations to determine the amounts of supplies destroyed by enemy fire in the combat being simulated. Given that supplies are being considered, the computations made here are quite reasonable. However, as currently coded, these computations are made whether or not supplies are being considered. Also, while the formulas used here are quite reasonable, the definition of the input

SLWCB(IW,ISPT,L) does not match its use in these formulas; the use is good, the definition is incorrect and should be changed—see Reference [12] for details.

5. Section 42 (Lines 4502-4565)

This section attempts to compute the numbers of weapons by type that are repairably damaged in the combat being simulated. It currently contains two errors (one coding error and one modeling error) that render its use questionable. It can simulate that weapons are either fully functional or fully destroyed by setting the input PWATS(IW,I,L) to 1.0 for all values of IW, I, and L. These errors are as follows.

The coding error is that WDIV(IW,ID) is treated on lines 4532 and 4534 as if it were the number of weapons of type IW in unit ID at the start of the combat being simulated. Due to line 4371, it isn't.

The modeling error is that line 4545 places no upper bound on the number of weapons that can be repaired at division level per cycle. It is wrong to require the assumption that division-level repair capabilities are essentially infinite, which the model currently does here.

6. Section 43 (Lines 4566-4598)

This section attempts to compute the numbers of casualties and weapon losses inflicted by air sorties in the sector without making use of previously computed numbers of casualties and weapon losses inflicted by aircraft. In particular, CDACS(IS,L) is correctly calculated here only if both FICAS(2,3–L) = 1.0 and IPLSC = 0, and WLDAS(IW,IS,L) is essentially never correct (no matter what the values of FICAS(2,3–L) and MVCASO, or any other inputs, are). The last line of this section ends the huge do-loop over sector started at the beginning of Part B, above.

J. PART J (LINES 4599-4783)

1. Section 44 (Lines 4599-4607)

This section computes the unweighted average of essentially arbitrary (for interdiction) scale factors discussed in (text) Section A.4, above.

3. Section 46 (Lines 4674-4702)

This section attempts to compute the average numbers of casualties and weapon losses inflicted by air sorties per sector in the region. Since CDACS is generally wrong and WLDAS is always wrong (see Section 43), so (respectively) are FPDCAS and FWDCAS.

4. Section 47 (Lines 4703-4723)

If these calculations are to be made here, then—

(1) the factors AMLFD(IAC,IS,L) and AMNLAF(IAC,1,L) should be applied to AMNL(IAC,IAM,IMT) here as they are on line 3191.

(2) munitions on aircraft that are killed in the air before those aircraft can attack ground targets (and any munitions that are jettisoned) could be considered somehow.

Alternatively, these calculations could be made in some routine called by Subroutine AC.

5. Section 48 (Lines 4724-4783)

Lines 4724, 4726, and 4728 are blank spacers; line 4725 resets IPRB; line 4727 is not needed; lines 4729 through 4782 are formats; and line 4783 ends GC.

III. A NUMERIC EXAMPLE FOR SUBROUTINE GC

Subroutine GC has no arguments—it receives all of its input data through common blocks. For the purposes here, "a subroutine input" is defined to be a variable or array in a common block that can be used without first being computed when code is processed according to some valid set of (model) input data.

For the example given below, all of the Subroutine GC input variables and arrays are grouped into the following three mutually exclusive and collectively exhaustive categories:

(a) Inputs whose values are identically zero in this example.

(b) "Bookkeeping," or extremely simplistic, inputs whose values are not identically zero here.

(c) Non-zero inputs that are directly "relevant" for this example.

With one set of exceptions (described below), no mention is made in the following discussions of any input in category (a). The distinction made here between inputs in categories (b) and (c) is as follows. Inputs in category (b) are listed with their example values on Table III-1, but are not discussed further in this chapter. Conversely, inputs in category (c) are both listed with their example values on Table III-2 and listed, again with their data values, in each text section below that corresponds to a code section in which that input appears. Deciding which inputs to put in which of these two categories is somewhat judgmental; the basic idea used here is as follows. Some inputs, like the number of types of ground weapons on each side, are used throughout, and giving their values once is good enough. Indeed, repeating their values everywhere that they are used would unnecessarily clutter the example. On the other hand, inputs like probabilities of kill are used in many fewer places, and those places are (generally) organically relevant to those inputs. Accordingly, it is useful for understanding the code to identify each such input and its value in conjunction with each place where these inputs are used.

Table III-1. Values of the Non-Zero Bookkeeping and Miscellaneous Inputs Used in this Example

BPD (ID) = PDIV(ID)
BWD(IW,ID) = WDIV(IW,ID)
DFBACT(L) = 1.0
FRRING(IT,KP,KT) = 1.0
ICBIT(ID) = ID
ICYCLE = 1
IDLABA(IDS,1) = IDS
IOMU = 5
ISA(1) = 1
ISAP(1) = 1
ISEFFD = 3
ITD(ID) = ID
IWTIGT(IWTGT,1,L)) = IWTGT
IWTIWC(INWPC,1,L) = INWPC
LNKWPT(IW,L) = IW
KPS(1) = 1
KTER(1) = 1
NAC(L) = 1
NAM(L) = 1
NDS(1,L) = 1
NEAEF(IC) = 2
NEDEF(IC) = 2
NS = 1
NW(L) = 2
NWAEFF(IC) = 2
NWDEFF(IC) = 2
NWTIGT(1,L) = 2
NWTIWC(1,L) = 2
TNGMOD(ID) = 1.0
TWD(IW,1) = WDIV(IW,1)
TWD(IW,2) = WDIV(IW,2)
XAEF(2,IC) = 1.0
XDEF(2,IC) = 1.0
XWAEF(2,IC) = 1.0
XWDEF(2,IC) = 1.0
YAEF(2,IC) = 1.0
YDEF(2,IC) = 1.0
YWAEF(2,IC) = 1.0
YWDEF(2,IC) = 1.0

Table III-2. Values of the Relevant Non-Zero Inputs Used in this Example

ACSABA(1,1,•)	=	10.	20.
AMLFD(1,1,•)	=	1.	1.
AMNL(1,1,2)	=	4.	
AMNL(1,1,8)	=	11.	
AMNLAF(1,1,•)	=	1.	1.
BPKAW(1,•,1)	=	0.500	0.500
BPKAW(2,•,1)	=	0.005	0.005
BSAWA(1,•,1)	=	0.5	0.5
BSAWA(2,•,1)	=	0.2	0.2
EFCE	=	0.00001	
ERTA(•,1,1)	=	0.4	0.4
ERTD(•,1,2)	=	0.4	11.0
FCVLS(•)	=	3.059	2.228
FICAS(2,•)	=	1.	1.
FPCR(•)	=	0.4	0.4
FTCWPL(•,1)	=	3.	1.
FTCWPL(•,2)	=	2.	2.
IPLSC	=	{either 0 or 1}	
IWUCE(1)	=	1	
MNIE	=	1000	
MVCASO	=	{either 0 or 1}	
NPCAF(1)	=	8	
NPCDF(2)	=	8	
PDIV(•)	=	3000.	800.
PWATS(•,1,1)	=	1.	1.
PWATS(•,3,2)	=	1.	1.
PWSF(•,1)	=	10.0	1.0
PWSF(•,2)	=	0.5	0.5
RPKDW(1,•,1)	=	0.500	0.500
RPKDW(2,•,1)	=	0.001	1.000
RSAWD(1,•,1)	=	0.90909	0.09091
RSAWD(2,•,1)	=	0.5	0.5
SAMA(1,•,1)	=	0.5	0.5
SAMD(1,•,2)	=	0.0	1.0
SFCAS(1,1,1)	=	1.	
SFCAS(1,2,2)	=	1.	
SFGND(1,1,1)	=	1.	
SFGND(1,2,2)	=	1.	
WDIV(•,1)	=	100.	200.
WDIV(•,2)	=	40.	40.
VAMAW(1,•,1)	=	0.5	0.5
VAMDW(1,•,2)	=	0.0	1.0
VIWASF(•,1)	=	1.	1.

XPCAF(•,1)	=	0.0	0.5	1.0	2.0	3.0	4.0	6.0	20.0
XPCDF(•,2)	=	0.0	0.5	1.0	2.0	3.0	4.0	6.0	20.0
YPCAF(1,•,1)	=	.100	.020	.015	.012	.010	.009	.008	.005
YPCDF(1,•,2)	=	.000	.010	.015.	.020	.022	.023	.024	.025

The one set of exceptions concerning the (zero-valued) inputs belonging to category (a) is as follows. The discussions below list the names of all "primary" inputs used by relevant sections of the code, and then list the values of the "relevant" inputs. All "relevant" inputs are considered to be "primary" inputs here; in addition, several potentially important (for full-up runs, if not for this example) zero-valued inputs are also considered to be "primary" and, thus, are also listed (by name only) in sections in which they appear. The overall goal here is to list the potentially important inputs concerning each section of the code, to list with their data values those inputs that are important for the particular example at hand, and to ignore (except in Table III-1) pure bookkeeping inputs. Note that the values of some of the inputs listed on Table III-1 are given in terms of arrays whose values are listed on Table III-2.

A. PART A (LINES 1-1762)

1. Section 1 (Lines 1-1613)

No calculations relevant to the numeric example given here are made in this section of the code.

2. Section 2 (Lines 1614-1665)

No calculation relevant to the numeric example given here are made in this section of the code.

3. Section 3 (Lines 1666-1740)

a. Inputs and Outputs

Primary Section Inputs	Source
PWSF(IW,L)	Model Input
BSAWA(IW,IWGT,KP)	Model Input
BSAWD(IW,IWGT,KP)	Model Input
RSAWA(IW,IWGT,KP)	Model Input
RSAWD(IW,IWGT,KP)	Model Input
SAMA(IAM,IGWT,L)	Model Input
SAMD(IAM,IGWT,L)	Model Input
SAMMA(IMM,IGWT,L)	Model Input
SAMMD(IMM,IGWT,L)	Model Input

Section Outputs	Next Relevant Use
PWSF(IW,L)	Section 11
BSAWA(IW,IWGT,KP)	Section 11
BSAWD(IW,IWGT,KP)	Section 11
RSAWA(IW,IWGT,KP)	Section 11
RSAWD(IW,IWGT,KP)	Section 11
SAMA(IAM,IGWT,L)	Section 11
SAMD(IAM,IGWT,L)	Section 11
SAMMA(IMM,IGWT,L)	N/A
SAMMD(IMM,IGWT,L)	N/A

Discussion

This section is entered only once during any given run of the model. In particular, it is entered only when GC is called for the first conventional combat cycle being simulated. When it is entered, it computes new (different) values for the elements of the arrays BSAWA, BSAWD, RSAWA, RSAWD, SAMA, SAMD, SAMMA, and SAMMD. Along with changing their values, this section changes the definition of these arrays from those given in Reference [4]. For example, the definition of BSAWA(IW,IWGT,KP) after Section 3 has been processed should be (assuming that each generic weapon type contains exactly one simulated weapon type) as follows.

BSAWA(IW,IWGT,KP): BSAWA(IW,IWGT,KP) is an input whose value is changed in Section 3 of GC. Its definition as an input is given in Reference [4]; its definition as a working array (i.e., its definition after its values have been changed by Section 3) is as follows. If there are W(KW) Red weapons of type KW present for KW = 1, 2, ..., NW(2), then the probability that a Blue weapon of type IW will allocate its fire against a particular Red weapon of type IWGT when Blue is on attack in posture KP is given by

$$\frac{\text{BSAWA(IW,IWGT,KP)}}{\text{WEIGHTED-SUM(IW,KP)}},$$

where:

$$\text{WEIGHTED-SUM(IW,KP)} = \text{BSAWA(IW,1,KP)*W(1)} + \text{BSAWA(IW,2,KP)*W(2)} + \ldots + \text{BSAWA(IW,NW(2),KP)*W(NW(2))}.$$

Accordingly, the probability that a Blue weapon of type IW will allocate its fire against some Red weapon of type IWGT when Blue is on attack in posture KP is given by

$$\frac{\text{BSAWA(IW,IWGT,KP)*W(IWGT)}}{\text{WEIGHTED-SUM(IW,KP)}}\ .$$

Thus, the model assumes that fire is allocated against target weapons according to the weighted number of target weapons of each type present, where the weighting factor for Red target weapons of type IWGT is given by BSAWA(IW,IWGT,KP) when the shooters are Blue weapons of type IW on attack in posture KP. In algebraic notation, before Section 3 is processed BSAWA corresponds to $\hat{A}^s_{ij}$ as defined on page III-8 of Reference [11]; afterwards it corresponds to C^s_{ij} as defined on page III-7 of that reference.

The other seven arrays whose values are changed here should be redefined analogously.

b. Numeric Example

Relevant Section Inputs	Data	
PWSF(•,1)	10.0	1.0
PWSF(•,2)	0.5	0.5
BSAWA(1,•,1)	0.5	0.5
BSAWA(2,•,1)	0.2	0.2
RSAWD(1,•,1)	0.90909	0.09091
RSAWD(2,•,1)	0.5	0.5
SAWA(1,•,1)	0.5	0.5
SAWD(1,•,2)	0.0	1.0

Relevant Section Outputs	Data	
BSAWA(1,•,1)	0.5	0.5
BSAWA(2,•,1)	0.5	0.5
RSAWD(1,•,1)	0.5	0.5
RSAWD(2,•,1)	0.5	0.5
RSAWD(2,•,1)	0.0909	0.9091
SAWA(1,•,1)	0.5	0.5
SAWD(1,•,2)	0.0	1.0

Discussion

The value of BSAWA(IW,IWGT,KP) after Section 3 has been processed can also be interpreted as the probability that a Blue weapon of type IW would fire at the one Red

weapon of type IWGT present if there were exactly one Red weapon of each type present (and if Blue were on attack in posture KP), and the analogous comment applies to the other allocation arrays. Note that, while each entry of PWSF should be strictly positive, these entries need not satisfy any other requirement. Note also that each entry of the input allocation arrays should be nonnegative, but these entries need not satisfy any other requirement. Each entry of the output allocation arrays, however, will always be between 0.0 and 1.0 (inclusive), and will always sum to 1.0 when summed over all target types, IWGT, for any particular shooting system, posture (if applicable), and side.

4. Section 4 (Lines 1741-1762)

No calculations relevant to the numeric example given here are made in this section of the code.

B. PART B (LINES 1763-1941)

1. Section 5 (Lines 1763-1806)

No calculations relevant to the numeric example given here are made in this section of the code.

2. Section 6 (Lines 1807-1896)

a. Inputs and Outputs

Primary Section Input	Source
WDIV(IW,ID)	Model Input

Section Outputs	Next Relevant Use
WS(IW,L)	Section 23
WSI(IW,IS,L)	Section 12

Discussion

For each relevant value of IW, this section of the code sets WSI(IW,IS,L) equal to the sum of WDIV(IW,ID) over those ID that are currently indexing a unit in combat in sector IS for side L.

b. Numeric Example

Relevant Section Inputs	Data	
WDIV(•,1)	100.	200.
WDIV(•,2)	40.	40.

Relevant Section Outputs	Data	
WS(•,1)	100.	200.
WS(•,2)	40.	40.
WSI(•,1,1)	100.	200.
WSI(•,1,2)	40.	40.

Discussion

Under the simplifying assumptions made here,

$$WS(IW,L) = WSI(IW,IS,L)$$

for all relevant IW,IS, and L. In general, this equality need not hold.

3. Section 7 (Lines 1897-1941)

This section initializes some arrays, but it makes no nontrivial calculations relevant to the numeric example given here.

C. PART C (LINES 1942-3040)

1. Section 8 (Lines 1942-1945)

This section initializes some arrays; but no nontrivial calculations relevant to the numeric example given here are made in this section of the code.

2. Section 9 (Lines 1946-1992)

No calculations relevant to the numeric example given here are made in this section of the code.

3. Section 10 (Lines 1993-2010)

No calculations relevant to the numeric example given here are made in this section of the code.

4. Section 11 (Lines 2011-2132)

a. Inputs and Outputs

Primary Section Inputs	Source
WSI(IW,IS,L)	Section 6
BSAWA(IW,IWGT,KP)	Section 3 for Cycle 1
BSAWD(IW,IWGT,KP)	Section 3 for Cycle 1
RSAWA(IW,IWGT,KP)	Section 3 for Cycle 1
RSAWD(IW,IWGT,KP)	Section 3 for Cycle 1
BFRASM(IW,IWGT,ISM)	Model Input
BFRDSM(IW,IWGT,ISM)	Model Input
RFRASM(IW,IWGT,ISM)	Model Input
RFRASM(IW,IWGT,ISM)	Model Input
SAMA(IAM,IGWT,L)	Section 3 for Cycle 1
SAMD(IAM,IGWT,L)	Section 3 for Cycle 1
SAMMA(IMM,IGWT,L)	Section 3 for Cycle 1
SAMMD(IMM,IGWT,L)	Section 3 for Cycle 1

Section Outputs	Next Relevant Use
SAWA(IW,KW,L)	Section 12
SAWD(IW,KW,L)	Section 12
BBFRASM(IW,KW,ISM)	N/A
BBFRDSM(IW,KW,ISM)	N/A
RRFRASM(IW,KW,ISM)	N/A
RRFRDSM(IW,KW,ISM)	N/A
SSAMA(IAM,KW,L)	Section 23
SSAMD(IAM,KW,L)	Section 23
SSAMMA(IMM,KW,L)	N/A
SSAMMD(IMM,KW,L)	N/A

Discussion

This section only concerns converting data entered by "generic" weapon type into data by "simulated" (or "actual") weapon type. A better approach might be to enter all data by"simulated" weapon type and to delete this section entirely.

b. Numeric Example

Relevant Section Inputs	Data	
BSAWA(1,•,1)	0.5	0.5
BSAWA(2,•,1)	0.5	0.5
RSAWD(1,•,1)	0.5	0.5
RSAWD(2,•,1)	0.0909	0.09091
SAMA(1,•,1)	0.5	0.5
SAMA(1,•,2)	0.0	1.0
WSI(•,1,1)	100.	200.
WSI(•,1,2)	40.	40.

Relevant Section Outputs	Data	
SAWA(1,•,1)	0.5	0.5
SAWA(2,•,1)	0.5	0.5
SAWD(1,•,2)	0.5	0.5
SAWD(2,•,2)	0.0909	0.9091
SSAMA(1,•,1)	0.5	0.5
SSAMD(1,•,2)	0.0	1.0

Discussion

Since in this example each generic weapon type corresponds to a simulated weapon type on a one-to-one basis, all this section does is to set the corresponding elements of various pairs of arrays equal to each other.

5. Section 12 (Lines 2133-2166)

a. Inputs and Outputs

Primary Section Inputs	Source
MVCASO	Model Input
SAWA(IW,KW,L)	Section 11
SAWD(IW,KW,L)	Section 11
WSI(IW,IS,L)	Section 6

Section Outputs	Next Relevant Use
AAWA(IW,KW,L)	Section 16
AAWD(IW,KW,L)	Section 16

Discussion

The discussion in Section 3.a, above, states that TACWAR allocates fire according to the weighted numbers of targets present, where the weighting factors can depend on the type of shooter and type of target involved. The number of targets of type KW "present" for (i.e., vulnerable to) ground fire by side L is given by WSI(IW,K), where K = 3 – L. The weighting factors for, say, Blue weapons of type IW on attack in posture KP were calculated in Section 3, above, and the values of those factors were stored in BSAWA(IW,IWGT,KP) for all relevant values of IWGT. Given that each generic type of weapon corresponds to exactly one simulated type of weapon for each side, Section 11 sets

$$\text{SAWA(IW,KW,L)} = \begin{cases} \text{BSAWA(IW,IWGT,KP)} & \text{L} = 1 \\ \text{RSAWA(IW,IWGT,KP)} & \text{L} = 2 \end{cases}$$

and

$$\text{SAWD(IW,KW,L)} = \begin{cases} \text{BSAWD(IW,IWGT,KP)} & \text{L} = 1 \\ \text{RSAWD(IW,IWGT,KP)} & \text{L} = 2 \end{cases},$$

where IW is the simulated weapon type that (by the assumption above, uniquely) corresponds to the generic weapon type IWGT, and KP denotes the supposed posture in the sector in question. Thus, substituting SAWA for BSAWA and substituting WSI for W in the expression for the allocation of fire given in Section A.3.a, above, and doing the same for RSAWA and for defensive allocations of fire, yields

$$\text{AAWA(IW,KW,L)} = \frac{\text{SAWA(IW,KW,L)*WSI(KW,K)}}{\text{SAWA(IW,1,L)*WSI(1,K)} + \text{SAWA(IW,2,L)*WSI(2,K)} + \ldots + \text{SAWA(IW,NW(K),L)*WSI(NW(K),K)}}$$

and

AAWD(IW,KW,L) =

$$\frac{\text{SAWD(IW,KW,L)*WSI(KW,K)}}{\text{SAWD(IW,1,L)*WSI(1,K) + SAWD(IW,2,L)*WSI(2,K) + ... + SAWD(IW,NW(K),L)*WSI(NW(K),K)}},$$

where AAWA(IW,KW,L) and AAWD(IW,KW,L) give the fraction (allocation) of the fire by weapons of type IW on side L that will be directed against enemy weapons of type KW for side L on attack and on defense, respectively, and where K = 3 – L. Section 12 implements these equations for AAWA and AAWD.

b. Numeric Example

Relevant Section Inputs	Data	
SAWA(1,•,1)	0.5	0.5
SAWA(2,•,1)	0.5	0.5
SAWD(1,•,2)	0.5	0.5
SAWD(2,•,2)	0.0909	0.9091
WSI(•,1,1)	100.	200.
WSI(•,1,2)	40.	40.

Relevant Section Outputs	Data	
AAWA(1,•,1)	0.5	0.5
AAWA(2,•,1)	0.5	0.5
AAWD(1,•,2)	0.3333	0.6667
AAWD(2,•,2)	0.0476	0.9524

Discussion

The numbers of Red weapons present—40 and 40—are in the same proportion as the input PWSF(•,2)—0.5 and 0.5; thus, the simulated allocations of Blue fire are the same as the input allocations, when normalized to sum to 1.0. The weighting factors calculated in Section 11 say that Red weapons of type 1 are equally likely to shoot at Blue type 2 weapons as at Blue type 1 weapons when there are equal numbers of each type of Blue weapon present; that is, the methodology used here assumes that Red type 1 weapons are twice as likely to shoot at Blue type 2 weapons than at Blue type 1 weapons when there are twice as many Blue type 2 weapons present. Similarly, the weighting factors calculated in Section 11 say that Red weapons of type 2 are 10 times more likely

to shoot at Blue type 2 weapons than at Blue type 1 weapons when there are equal numbers of each type present. Hence, Red type 2 weapons are 20 times more likely to shoot at Blue type 2 weapons than at Blue type 1 weapons when there are twice as many Blue type 2 weapons present. Accordingly, AAWD here satisfies the properties that

$$AAWD(1,2,2) = 2*AAWD(1,1,2)$$

and

$$AAWD(2,2,2) = 20*AAWD(2,1,2).$$

Of course, these allocations must sum to 1.0 across target types; that is, AAWD must satisfy both

$$AAWD(1,1,2) + AAWD(1,2,2) = 1.0$$

and

$$AAWD(2,1,2) + AAWD(2,2,2) = 1.0 \ .$$

Note that the values for AAWD above are the unique solutions to these equations.

6. Section 13 (Lines 2167-2210)

a. Inputs and Outputs

<u>Primary Section Inputs</u>	<u>Source</u>
ERTA(IW,KP,L)	Model Input
ERTD(IW,KP,L)	Model Input
<u>Section Outputs</u>	<u>Next Relevant Use</u>
EERTA(IW,KP,L)	Section 17
EERTD(IW,KP,L)	Section 17

<u>Discussion</u>

As noted in Chapter II, above, either some meaningful calculations could be made here (such as applying the factors FRRINA and FRRINH here instead of in Section 21, and then deleting Section 21), or this section could be deleted, and EERTA and EERTD could be replaced by ERTA and ERTD, respectively, throughout the code.

b. Numeric Example

Relevant Section Inputs	Data	
ERTA(•,1,1)	0.4	0.4
ERTD(•,1,2)	0.4	11.0

Relevant Section Outputs	Data	
EERTA(•,1,1)	0.4	0.4
EERTD(•,1,2)	0.4	11.0

7. Section 14 (Lines 2211-2293)

This section concerns only preferred munitions and therefore contains no calculations relevant to the numeric example.

8. Section 15 (Lines 2294-2542)

No calculations whatsoever are made here.

9. Section 16 (Lines 2543-2577)

a. Inputs and Outputs

Primary Section Inputs	Source
BAWASM(IW,KW,ISM)	Section 14
BAWDSM(IW,KW,ISM)	Section 14
RAWASM(IW,KW,ISM)	Section 14
RAWDSM(IW,KW,ISM)	Section 14
AAWA(IW,KW,L)	Section 12
AAWD(IW,KW,L)	Section 12

Section Outputs	Next Relevant Use
AAWA(IW,KW,L)	Section 18
AAWD(IW,KW,L)	Section 18

Discussion

This section changes the definitions of AAWA and AAWD. Just before this section, AAWA(IW,KW,L) gives the fraction of the engagements by weapons of type IW

on side L that will be made against enemy weapon of type KW if side L is on attack. Accordingly, just before this section, AAWA(IW,KW,L) sums to 1.0 over KW for each relevant IW and L. Just after this section, AAWA(IW,KW,L) gives the fraction of the engagements by weapons of type IW on side L that will be made against enemy weapons of type KW using nonpreferred munitions if side L is on attack. Accordingly, just after this section, AAWA(IW,KW,L) sums over KW to the fraction of engagements by weapons of type IW on side L that will be made (against all enemy weapons) using nonpreferred munitions if side L is on attack. Of course, the analogous comments apply to AAWD and side L on defense.

b. Numeric Example

Relevant Section Inputs	Data	
AAWA(1,•,1)	0.5000	0.5000
AAWA(2,•,1)	0.5000	0.5000
AAWD(1,•,2)	0.3333	0.6667
AAWD(2,•,2)	0.0476	0.9524

Relevant Section Outputs	Data	
AAWA(1,•,1)	0.5000	0.5000
AAWA(2,•,1)	0.5000	0.5000
AAWD(1,•,2)	0.3333	0.6667
AAWD(2,•,2)	0.0476	0.9524

Discussion

Since, in this example, it is assumed that all weapons are using nonpreferred munitions in all of their engagements, this section does not change the values of AAWA and AAWD.

10. Section 17 (Lines 2578-2638)

a. Inputs and Outputs

Primary Section Inputs	Source
EERTA(IW,KP,L)	Section 13
EERTD(IW,KP,L)	Section 13

BPKASM(IW,KW,ISM)	Model Input
BPKDSM(IW,KW,ISM)	Model Input
RPKASM(IW,KW,ISM)	Model Input
RPKDSM(IW,KW,ISM)	Model Input
FPKASM(KP)	Model Input
FPKDSM(KP)	Model Input
BPKAW(IW,KW,KP)	Model Input
BPKDW(IW,KW,KP)	Model Input
RPKAW(IW,KW,KP)	Model Input
RPKDW(IW,KW,KP)	Model Input
Section Outputs	Next Relevant Use
BVWASM(IW,KW,L)	N/A
BVWDSM(IW,KW,L)	N/A
RVWASM(IW,KW,L)	N/A
RVWDSM(IW,KW,L)	N/A
VIWAW(IW,KW,L)	Section 18
VIWDW(IW,KW,L)	Section 18

Discussion

J-8's TACWAR makes extensive use of the product of the number of engagements each shooter can make, on average, per time period (e.g., EERTA) times the allocation of those engagements to the various types of targets (e.g., AAWA) times the probability of kill by that type of shooter against that type of target in one of those engagements (i.e., BPKAW). This section computes only part of this product; e.g., it computes

EERTA(IW,KP,1)*BPKAW(IW,KW,KP).

Section 18, which follows, finishes the multiplication by computing, for example,

AAWA(IW,KW,1)*[EERTA(IW,KP,1)*BPKAW(IW,KW,KP)].

The only role played by VIWAW and VIWDW is to pass this (partial) product from Section 17 to Section 18. In short, the relatively small arrays VIWAW and VIWDW, as well as the corresponding (for preferred munitions) quite large arrays BVWASM, BVWDSM, RVWASM, and RVWDSM, serve a very limited purpose.

b. Numeric Example

Relevant Section Inputs	Data	
EERTA(•,1,1)	0.4	0.4
EERTD(•,1,2)	0.4	11.0
BPKAW(1,•,1)	0.500	0.500
BPKAW(2,•,1)	0.005	0.005
RPKDW(1,•,1)	0.500	0.500
RPKDW(2,•,1)	0.001	1.000

Relevant Section Outputs	Data	
VIWAW(1,•,1)	0.200	0.200
VIWAW(2,•,1)	0.002	0.002
VIWDW(1,•,2)	0.200	0.200
VIWDW(2,•,2)	0.011	11.000

11. Section 18 (Lines 2639-2697)

a. Inputs and Outputs

Primary Section Inputs	Source
BAWASM(IW,KW,L)	Section 14
BAWDSM(IW,KW,L)	Section 14
BVWASM(IW,KW,L)	Section 17
BVWDSM(IW,KW,L)	Section 17
RAWASM(IW,KW,L)	Section 14
RAWDSM(IW,KW,L)	Section 14
RVWASM(IW,KW,L)	Section 17
RVWDSM(IW,KW,L)	Section 17
AAWA(IW,KW,L)	Section 16
AAWD(IW,KW,L)	Section 16
VIWAW(IW,KW,L)	Section 17
VIWDW(IW,KW,L)	Section 17

Section Outputs	Next Relevant Use
PWAKSM(IW,KW,ISM,L)	N/A
PWDKSM(IW,KW,ISM,L)	N/A
PWAKW(IW,KW,L)	Section 24
PWDKW(IW,KW,L)	Section 24

Discussion

After the loop from line 2670 through line 2675, PWAKW and PWDKW give weapon-on-weapon kill rates counting only those kills caused by nonpreferred munitions; however, after this section has been processed (i.e., after the loop ending on line 2697), these arrays give weapon-on-weapon kill rates counting all kills (i.e., caused by any type of munition, preferred or not). Of course, in the numeric example given here, the values in these arrays just after line 2697 are the same as the values just after line 2675 since no preferred weapons are being used in this example.

b. Numeric Example

Relevant Section Inputs	Data	
AAWA(1,•,1)	0.5000	0.5000
AAWA(2,•,1)	0.5000	0.5000
AAWD(1,•,2)	0.3333	0.6667
AAWD(2,•,2)	0.0476	0.9524
VIWAW(1,•,1)	0.2000	0.2000
VIWAW(2,•,1)	0.0020	0.0020
VIWDW(1,•,2)	0.2000	0.2000
VIWDW(2,•,2)	0.0110	11.0000

Relevant Section Outputs	Data	
PWAKW(1,•,1)	0.1000	0.1000
PWAKW(2,•,1)	0.0010	0.0010
PWDKW(1,•,2)	0.0667	0.1333
PWDKW(2,•,2)	0.0005	10.4762

Discussion

This section completes the multiplications started in Section 17.

12. Section 19 (Lines 2698-2911)

This section concerns writing outputs only; it makes no relevant calculations for the numeric example given here.

13. Section 20 (Lines 2912-3017)

a. Inputs and Outputs

Primary Section Inputs	Source
EERTA(IW,KP,L)	Section 13
EERTD(IW,KP,L)	Section 13
AAWA(IW,KW,L)	Section 16
AAWD(IW,KW,L)	Section 16
BAWASM(IW,KW,ISM)	Section 14
BAWDSM(IW,KW,ISM)	Section 14
RAWASM(IW,KW,ISM)	Section 14
RAWDSM(IW,KW,ISM)	Section 14
Section Outputs	**Next Relevant Use**
EXNPMN(IW,KW,L)	Section 34
TEXNPM(IW,IS,L)	Section 34
EXPMN(IW,KW,ISM,IS,L)	N/A
SMENG(IW,ISM,IS,L)	N/A

Discussion

The outputs of this section are scaled in Section 34, but these outputs are not used to calculate the values of any other variable or array in Subroutine GC (nor are they cumulative values).

b. Numeric Example

Relevant Section Inputs	Data	
EERTA(•,1,1)	0.4000	0.4000
EERTD(•,1,2)	0.4000	11.0000
AAWA(1,•,1)	0.5000	0.5000
AAWA(2,•,1)	0.5000	0.5000
AAWD(1,•,2)	0.3333	0.6667
AAWD(2,•,2)	0.0476	0.9524

Relevant Section Outputs	Data	
EXNPMN(1,•,1)	0.2000	0.2000
EXNPMN(2,•,1)	0.2000	0.2000
EXNPMN(1,•,2)	0.1333	0.2667
EXNPMN(2,•,2)	0.5238	10.4762
TEXNPM(•,1,1)	0.4000	0.4000
TEXNPM(•,1,2)	0.4000	11.0000

Discussion

It is no coincidence that TEXNPM equals EERTA for the attacker and EERTD for the defender. These equalities must hold whenever the weapons systems involved use only nonpreferred munitions.

14. Section 21 (Lines 3018-3040)

No calculations relevant to the numeric example given here are made in this section of the code.

D. PART D (LINES 3041-3249)

1. Section 22 (Lines 3041-3115)

a. Inputs and Outputs

Primary Section Inputs	Source
MVCASO	Model Input
IWUCE(IW)	Model Input
WSI(IW,IS,1)	Section 6
Section Outputs	**Next Relevant Use**
IWUCEE	Section 24
ISA(IS)	N/A
FRAD(IS)	N/A
KPS(IS)	N/A
IWUCES(IS)	Subroutine Output

b. Numeric Example

Relevant Section Inputs	Data
MVCASO	either 0 or 1
IWUCE(1)	1
WSI(•,1,1)	100. 200.
Relevant Section Outputs	**Data**
IWUCEE	1
IWUCES(1)	1

Discussion

According to the data in this example, this section of the code sets IWUCEE = IWUCE(1), and it does not change the values of ISA(1), FRAD(1), or KPS(1); accordingly, the code here has no effect on this example.

2. **Section 23 (Lines 3116-3249)**

a. Inputs and Outputs

Primary Section Inputs	Source
MVCASO	Model Input
SSAMA(IAM,KW,L)	Section 11
SAMMD(IAM,KW,L)	Section 11
SSAMMA(IMM,KW,L)	Section 11
SSAMMD(IMM,KW,L)	Section 11
WS(IW,L)	Section 6
AMLFD(IAC,IS,L)	Subroutine Input
AMNLAF(IAC,1,L)	Model Input
AMNL(IAC,IAM,2)	Model Input
AMNL(IAC,IAM,8)	Model Input
VAMAW(IAM,KW,L)	Model Input
VAMDW(IAM,KW,L)	Model Input
SSMNLI(ISSM,IMM,L)	Model Input
VMMAW(IMM,KW,L)	Model Input
VMMDW(IMM,KW,L)	Model Input

Section Outputs	Next Relevant Use
PAAKW(IAC,KW,L)	Section 24
PADKW(IAC,KW,L)	Section 24
PMAKW(ISSM,KW,L)	N/A
PMDKW(ISSM,KW,L)	N/A

Discussion

This section essentially does for both aircraft and SSMs what Sections 12, 13, 14, 16, 17, 18, and 19 (combined) do for ground weapons.

b. Numeric Example

Relevant Section Inputs	Data	
MVCASO	either 0 or 1	
SSAMA(1,•,1)	0.5	0.5
SSAMD(1,•,2)	0.0	1.0

WS(•,1)	100.	200.
WS(•,2)	40.	40.
AMLFD(1,1,•)	1.	1.
AMNLAF(1,1,•)	1.	1.
AMNL(1,1,2)	4.	
AMNL(1,1,8)	11.	
VAMAW(1,•,1)	0.5	0.5
VAMDW(1,•,2)	0.0	1.0

Relevant Section Outputs	Data	
PAAKW(1,•,1)	1.0	1.0
PADKW(1,•,2)	0.0	11.0

Discussion

Given that the data for SSAMA(1,•,1) say that Blue aircraft would allocate their fire equally to the two types of Red ground weapons if equal numbers of those weapons were present, that the data for WS(•,2) say that equal numbers are present, and that the data for AMLFD(1,1,1), AMNLAF(1,1,1), and AMNL(1,1,2) say that each penetrating Blue aircraft can attempt 4 engagements, it follows that each Blue aircraft attempts 2 engagements against Red ground weapons of each type. Since the data for VAMAW(1,•,1) say that these aircraft have a probability of kill per engagement of 0.5 against either type of Red ground weapon, each Blue aircraft can (potentially) kill 1 ground weapon of each type per (successfully penetrating) sortie. Thus, these data yield that PAAKW(1,KW,1) = 1.0 for both KW = 1 and KW = 2.

Given that the data for SSAMD(1,•,2) say that Red aircraft allocate all of their fire against Blue ground weapons of type 2; that, based on these data, each penetrating Red aircraft can attempt 11 engagements; and that the data for VAMDW(1,2,2) say that these aircraft have a probability of kill per engagement of 1.0 against Blue weapons of type 2, PADKW(1,1,2) = 0.0 and PADKW(1,2,2) = 11.0.

E. PART E (LINES 3250-3942)

1. Section 24 (Lines 3250-3397)

a. Inputs and Outputs

Primary Section Inputs	Source
PWAKW(IW,KW,L)	Section 23
PWDKW(IW,KW,L)	Section 23
VIWASF(IW,1)	Subroutine Input
IWUCEE	Section 22
MNIE	Model Input
EFCE	Model Input
PAAKW(IAC,KW,L)	Section 23
PADKW(IAC,KW,L)	Section 23
PMAKW(ISSM,KW,L)	Section 23
PMDKW(ISSM,KW,L)	Section 23

Section Outputs	Next Relevant Use
VIWACF(IW,IS,L)	Section 25
VIWDCF(IW,IS,L)	Section 25
VIAACF(IAC,IS,L)	Section 26
VIADCF(IAC,IS,L)	Section 26
VIMACF(ISSM,IS,L)	N/A
VIMDCF(ISSM,IS,L)	N/A

Discussion

This section computes the antipotential potential scores for ground weapons (VIWACF and VIWDCF), for aircraft (VIAACF and VIADCF), and for SSMs (VIMACF and VIMDCF) based on the kill rate matrices PWAKW and PWDKW (for ground weapons versus ground weapons), PAAKW and PADKW (for aircraft firing at ground weapons), and PMAKW and PMDKW (for SSMs firing at ground weapons.) This section calls Subroutines EIGENV and MPROD to help make these calculations, and it is the only section in GC that calls EIGENV or MPROD.

b. Numeric Example

Relevant Section Inputs	Data	
PWAKW(1,•,1)	0.1000	0.1000
PWAKW(2,•,1)	0.0010	0.0010
PWDKW(1,•,2)	0.0667	0.1333
PWDKW(2,•,2)	0.0005	10.4762
VIWASF(•,1)	1.	1.
IWUCEE	1	
MNIE	1000	
EFCE	0.00001	
PAAKW(1,•,1)	1.0	1.0
PADKW(1,•,2)	0.0	11.0

Relevant Section Outputs	Data	
VIWACF(•,1,1)	1.0000	0.0100
VIWDCF(•,1,2)	0.5166	0.7998
VIAACF(1,1,1)	10.000	
VIADCF(1,1,2)	0.836	

Discussion

Antipotential potential scores for grounds weapons are eigenvectors of the product matrix of ground versus ground kill rate matrices (see Appendix A of Reference [11] for details). These eigenvectors are computed in Subroutine EIGENV using an iterative technique. VIWASF(IW,1), MNIE, and EFCE are used only to give a starting point for the iterative technique, to put an upper bound on the number of iterations attempted, and to stop the iteration when convergence is close enough, respectively. If the kill rate matrices are "well behaved," then this technique will converge very quickly (and so, in general, the value of MNIE is not important just as long as it is not too small, and a very small value can be used for EFCE). Also, if the kill rate matrices are "well behaved," this technique is guaranteed to converge to a unique (up to a scaling constant) eigenvector, so (except for running time) the values for VIWASF are irrelevant—any strictly positive vector would suffice (of course, the closer VIWASF is to the eigenvector to be found, the shorter the running time will be).

The point here is not to specify how Subroutine EIGENV works; instead, it is to observe what EIGENV produces. For VIWACF(•,1,1) to be an antipotential potential weapons score vector, it must be an eigenvector of the matrix R_1(IW,JW), where

$$R_1(IW,JW) = \sum_{KW=1}^{NW(2)} PWAKW(IW,KW,1)*PWDKW(KW,JW,2)\,.$$

In addition, it must satisfy two scaling properties, one of which is simply that VIWACF(IWUCEE,1,1) = 1; the other scaling property is discussed below.

To see that VIWACF is an eigenvector of R_1, note that

$$VIWACF(\bullet,1,1) = \begin{bmatrix} 1.0000 \\ 0.0100 \end{bmatrix},$$

$$[R_1(IW,JW)] = \begin{bmatrix} 0.006722 & 1.06095 \\ 0.000067 & 0.01061 \end{bmatrix},$$

and

$$\lambda_1 \begin{bmatrix} 1.0000 \\ 0.0100 \end{bmatrix} = \begin{bmatrix} 0.006722 & 1.06095 \\ 0.000067 & 0.01061 \end{bmatrix} \begin{bmatrix} 1.0000 \\ 0.0100 \end{bmatrix} = \begin{bmatrix} 0.01733 \\ 0.00017 \end{bmatrix}$$

for $\lambda_1 = 0.01733$. Analogously for Side 2, note that

$$R_2(IW,JW) = \sum_{KW=1}^{NW(1)} PWDKW(IW,KW,2)*PWAKW(KW,JW,1)\,,$$

so

$$[R_2(IW,JW)] = \begin{bmatrix} .006800 & .006800 \\ .010531 & .010531 \end{bmatrix}$$

and

$$\lambda_2 \begin{bmatrix} 0.5166 \\ 0.7998 \end{bmatrix} = \begin{bmatrix} .006800 & .006800 \\ .010531 & .010531 \end{bmatrix} \begin{bmatrix} 0.5166 \\ 0.7998 \end{bmatrix} = \begin{bmatrix} 0.00895152 \\ 0.013863 \end{bmatrix},$$

where, as required by the theory of eigenvalues, $\lambda_2 = \lambda_1 = 0.01733$.

Let

$$\beta = \sqrt{\lambda_1} = \sqrt{\lambda_2} = 0.1316\,.$$

Then antipotential potential also requires that VIWDCF(•,1,2) be scaled so that

$$\beta * \text{VIWDCF(IW,1,2)} = \sum_{KW=1}^{NW(1)} \text{PWDKW(IW,KW,2)} * \text{VIWACF(KW,1,1)}$$

for all IW from 1 through NW(2), and so (necessarily)

$$\beta * \text{VIWACF(IW,1,1)} = \sum_{KW=1}^{NW(2)} \text{PWAKW(IW,KW,1)} * \text{VIWDCF(KW,1,2)}$$

for all IW from 1 through NW(1). To see that these equations hold here, note that

$$0.1316 \begin{bmatrix} 0.5166 \\ 0.7998 \end{bmatrix} = \begin{bmatrix} 0.0667 & 0.1333 \\ 0.0005 & 10.4762 \end{bmatrix} \begin{bmatrix} 1.0000 \\ 0.0010 \end{bmatrix}$$

and that

$$0.1316 \begin{bmatrix} 1.0000 \\ 0.0100 \end{bmatrix} = \begin{bmatrix} 0.1000 & 0.1000 \\ 0.0100 & 0.0100 \end{bmatrix} \begin{bmatrix} 0.5166 \\ 0.7998 \end{bmatrix}$$

to within a reasonable tolerance for rounding in the final decimal place. Note also that the last two equations give a numeric example for the basic antipotential potential assumptions: (1) that the scores for Red weapons,

Red type 1: 0.5166

Red type 2: 0.7998 ,

are proportional to the rate at which these weapons are killing Blue weapons,

	Target	
Shooter	Blue type 1	Blue type 2
Red type 1:	0.0667	0.1333
Red type 2:	0.0005	10.4762 ,

times the scores for the Blue weapons,

Blue type 1: 1.0000

Blue type 2: 0.0100 ;

and (2) that the scores for Blue weapons (given just above) are proportional to the rate at which these weapons are killing Red weapons,

	Target	
Shooter	Red type 1	Red type 2
Blue type 1:	0.1000	0.1000
Blue type 2:	0.0100	0.0100 ,

times the scores for the Red weapons (given above), where the constant of proportionality, 0.1316 here, must be the same for both sides.

Antipotential potential calculates the scores for aircraft using an analogous assumption with the same constant of proportionality. Accordingly, in the example here,

$$VIAACF(1,1,1) = \left(\frac{1}{\beta}\right) * \begin{bmatrix} 1.0 & 1.0 \end{bmatrix} \begin{bmatrix} 0.5166 \\ 0.7998 \end{bmatrix}$$

$$= \frac{1}{0.1316} * (1.3164) = 10.000 \, ,$$

and

$$VIADCF(1,1,2) = \left(\frac{1}{\beta}\right) * \begin{bmatrix} 0.0 & 11.0 \end{bmatrix} \begin{bmatrix} 1.000 \\ 0.010 \end{bmatrix}$$

$$= \left(\frac{1}{0.1316}\right) * (0.11) = 0.836 \, ,$$

which gives the scores for the Blue and Red aircraft, respectively.

2. Section 25 (Lines 3398-3605)

a. Inputs and Outputs

Primary Section Inputs	Source
BWD(IW,ID)	Subroutine Input
WDIV(IW,ID)	Model Input
TWD(IW,IT)	Model Input
VIWACF(IW,IS,L)	Section 24
VIWDCF(IW,IS,L)	Section 24
BPD(ID)	Subroutine Input
PDIV(ID)	Model Input
NEAEF(IC)	Model Input

NEDEF(IC)	Model Input
XAEF(IEAEF,IC)	Model Input
XDEF(IEDEF,IC)	Model Input
YAEF(IEAEF,IC)	Model Input
YDEF(IEDEF,IC)	Model Input
NWAEFF(IC)	Model Input
NWDEFF(IC)	Model Input
XWAEF(IWAEF,IC)	Model Input
XWDEF(IWDEF,IC)	Model Input
YWAEF(IWAEF,IC)	Model Input
YWDEF(IWDEF,IC)	Model Input
TNGMOD(ID)	Subroutine Input
FSEFED	Model Input
Section Outputs	Next Relevant Use
EFFDA(ID)	Subroutine Output
EFFDD(ID)	Subroutine Output
VDAC(ID)	Subroutine Output
VDDC(ID)	Subroutine Output
VGABA(IS,L)	Section 29
VGDBA(IS,L)	Section 29
VGABAI(IS,L)	Section 27
VGDBAI(IS,L)	Section 27

Discussion

For each ground unit in combat, this section (re)calculates the numbers of weapons by type that are allowed on the front and then (using the weapon scores from Section 24) calculates both the total scores of all of the weapons on each side that are somehow involved in ground combat (VGABA and VGDBA) and the total scores of the portions of these weapons that are allowed on the front (VGABAI and VGDBAI). These scores can then be degraded as follows: nonlinearly to account for shortfalls (relative to fully authorized strengths) in the number of people and the number of equivalent weapons, by a weighted average of nonlinear degradations due to shortfalls of supplies (by type of supplies), and by an input factor to account for training.

In the relatively simple example here, all of the weapons involved in the ground combat calculations are allowed on the front (so VGABA = VGABAI and VGDBA =

VGDBAI), all units are at full strength in terms of numbers of weapons and people, supply shortages are not simulated, and the training factor is assumed to be 1.0. Thus, in this example, this section only computes VGABA, VGABAI, VGDBA, and VGDBAI as the sum over weapon types of the number of weapons present by type times the score per weapon for weapons of that type (on attack or defense, as appropriate). The code used here becomes more complex, and, arguably, contains some potential problems if these other factors (shortages in people, weapons, and supplies, and limited fronts) are considered (see Reference [12]).

b. Numeric Example

Relevant Section Inputs	Data	
PDIV(•)	3000.	800.
WDIV(•,1)	100.	200.
WDIV(•,2)	40.	40.
VIWACF(•,1,1)	1.0000	0.0100
VIWDCF(•,1,2)	0.5166	0.7998

Relevant Section Outputs	Data
VGABA(1,1)	102.00
VGABAI(1,1)	102.00
VGDBA(1,2)	105.31
VGDBAI(1,2)	105.31

3. Section 26 (Lines 3606-3640)

a. Inputs and Outputs

Primary Section Inputs	Source
ACSABA(IAC,IS,L)	Subroutine Input
VIAACF(IAC,IS,L)	Section 24
VIADCF(IAC,IS,L)	Section 24
SSMALO(ISSM,IS,L)	Section 2
VIMACF(ISSM,IS,L)	Section 24
VIMDCF(ISSM,IS,L)	Section 24

Section Outputs	Next Relevant Use
VAABA(IS,L)	Section 27
VADBA(IS,L)	Section 27
VMABA(IS,L)	N/A
VMDBA(IS,L)	N/A

Discussion

This section only states, for example, that if ACSABA(1,1,1) sorties of aircraft of type 1 on Side 1 penetrate Side 2's defenses far enough to deliver their ordnance on close air support, and if each such sortie has a score of VIAACF(1,1,1), then the total score for all of these sorties is the product ACSABA(1,1,1)*VIAACF(1,1,1).

b. Numeric Example

Relevant Section Inputs	Data	
ACSABA(1,1,•)	10.	20.
VIAACF(1,1,1)	10.000	
VIADCF(1,1,2)	0.836	
Relevant Section Outputs	Data	
VAABA(1,1)	100.00	
VADBA(1,1)	16.72	

4. Section 27 (Lines 3641-3771)

a. Inputs and Outputs

Primary Section Inputs	Source
VGABAI(IS,L)	Section 25
VGDBAI(IS,L)	Section 25
VAABA(IS,L)	Section 26
VADBA(IS,L)	Section 26
VMABA(IS,L)	Section 26
VMDBA(IS,L)	Section 26
FRATA(KP,ISATT)	Model Input
ISCEF(IS)	Subroutine Input

Section Outputs	Next Relevant Use
ICSA	N/A
ISA(1)	N/A
ISATT	N/A
FRAD(1)	Subroutine Output

Discussion

Due to the simplifying assumptions made here, Side 1 is necessarily both the "probable" and the "actual" sector attacker, so most of the calculations in this section, while potentially quite important, are not applicable in this example. Note, however, that FRAD is calculated here for use by Subroutine FEBA, which Program TACWAR calls after it calls GC.

b. Numeric Example

Relevant Section Inputs	Data
VGABAI(1,1)	102.00
VGDBAI(1,2)	105.31
VAABA(1,1)	100.00
VADBA(1,2)	16.72

Relevant Section Output	Data
FRAD(1)	1.655

Discussion

The total Side 1 (ground plus air) force strength is 102 + 100 = 202, and the (ground plus air) Side 2 strength is 105.31 + 16.72 = 122.03, which gives a force ratio of 202.00/122.03 = 1.655

5. Section 28 (Lines 3772-3803)

This section concerns reductions in effectiveness due to simultaneous supply shortages, and so is not relevant to the numerical example here.

6. Section 29 (Lines 3804-3891)

a. Inputs and Outputs

Primary Section Inputs	Source
VGABAI(IS,L)	Section 25
VGDBAI(IS,L)	Section 25
VGABA(IS,L)	Section 25
VGDBA(IS,L)	Section 25
VAABA(IS,L)	Section 26
VADBA(IS,L)	Section 26
VMABA(IS,L)	Section 26
VMDBA(IS,L)	Section 26
FASFRC	Model Input
FDSFRC	Model Input
PPESE	Section 28
NPCAF(L)	Model Input
XPCAF(IPCAF,L)	Model Input
YPCAF(KP,IPCAF,L)	Model Input
NPCDF(L)	Model Input
XPCDF(IPCDF,L)	Model Input
YPCDF(KP,IPCDF,L)	Model Input
FCVLS(L)	Model Input
Section Outputs	**Next Relevant Use**
PCS(L)	Section 38
VLS(L)	Section 32

Discussion

This section is (in a logical sense) backwards. Logically, the code should first compute weapons lost by type based on an an appropriate attrition structure, then compute total weapon value lost and associated personnel losses based on these weapons losses. This section does the opposite. It first attempts to compute total weapon value lost and (optionally) percent casualties, and then later computes weapons lost by type and (optionally) personnel losses based on this total value lost and this percent casualties. There are two errors in the code here. First, as mentioned above, the use of PPESE on lines 3867 and 3876 "double counts" the impact of supply shortages when both sides are

suffering such shortages. Since the example being discussed does not consider supply shortages, this error has no effect here. (If supplies are not being addressed, Sections 25 and 28 set PPESE = 1.) Second, as discussed in Reference [11], FASFRC should apply to VMABA as well as to VAABA on lines 3827 and 3828, and FDSFRC should apply to VMDBA as well as to VADBA on line 3829. Since the example being discussed does not consider SSMs, this error also has no effect here.

If MVCASO = 1, then VLS(L) is never used (code Section 32 is not processed), the values input for FCVLS(L) are ignored, and the values computed here for VLS(L) mean nothing. If MVCASO ≠ 1, then the values computed here for VLS(L) are used by GC as described in the discussion of (code) Section 32, below.

If IPLSC = 0 and MVCASO = 0, then PCS(L) has two simultaneous meanings. First, it gives the fraction (percent) of the number of personnel (as determined by PDIV(ID) for the relevant values of ID) that are lost (i.e., become casualties) on side L due to the combat (in the sector and cycle) being simulated. Second, it also gives a term which, when multiplied by the input FCVLS(L), is assumed to give the absolute amount of value lost on side L (where value is measured by antipotential potential scores) due to all losses of ground weapons in this combat. If IPLSC = 0 and MVCASO = 1, then PCS(L) has only the first meaning, not the second. If IPLSC = 1 and MVCASO = 0, then PCS(L) has only the second meaning, not the first—accordingly in this case, PCS(L) does not (except as a fluke) give the percent casualties in a sector. Finally, if IPLSC = 1 and MVCASO = 1, then, like VLS(L), PCS(L) is never used and the values computed here for PCS(L) mean nothing. Accordingly, if IPLSC = 1 and MVCASO = 1, all of the computations made in this section are useless, and the values of the inputs FASFRC, FDSFRC, NPCAF, NDCDF, XPCAF, XPCDF, YPCAF, and YPCAF, as well as FCVLS, have no effect on any of the results of GC.

b. Numeric Example

Relevant Section Inputs	Data
VGABAI(1,1)	102.00
VGDBAI(1,2)	105.31
VGABA(1,1)	102.00
VGDBA(1,2)	105.31
VAABA(1,1)	100.00
VADBA(1,2)	16.72

PPESE					1.0			
NPCAF(1)					8			
XPCAF(•,1)	0.	.5	1.	2.	3.	4.	6.	20.
XPCAF(1,•,1)	.100	.020	.015	.012	.010	.009	.008	.005
NPCDF(2)					8			
XPCDF(•,2)	0.	.5	1.	2.	3.	4.	6.	20.
YPCDF(1,•,2)	.0	.010	.015	.020	.022	.023	.024	.025
FCVLS(•)			3.059		2.228			

Relevant Section Outputs	Data	
PCS(•)	0.01664	0.01959
VLS(•)	5.192	4.596

Discussion

As discussed in Reference [12], 0.0 is the only logically correct value that can be assigned to FASFRC and FDSFRC concerning aircraft—and the code is simply wrong concerning SSMs. Rather than extend FASFRC and FRSFRC to apply to SSMs as well as aircraft, a better fix to the code here might be to eliminate those inputs entirely, and to replace lines 3827 and 3828 with

$$FRCA = VGABA(IS,L) / TEMP,$$

to delete line 3829, and to replace TEMP1 with VGABAI(IS,L) on lines 3830, 3831, 3833, and 3834.

Setting

$$FASFRC = FDSFRC = 0.0$$

yields

$$FRCA = 102.00/122.03 = 0.836$$

and

$$FRCD = 202.00/105.31 = 1.918.$$

Thus,

$$PCS(1) = (.020)\left(\frac{.164}{.500}\right) + (.015)\left(\frac{.336}{.500}\right) = 0.01664$$

and

$$PCS(2) = (.015)\,(.082) + (.020)\,(.918) = 0.01959.$$

Thus,

$$VLS(1) = (102.00)\,(0.01664)\,(3.059) = 5.192$$

and

$$VLS(2) = (105.31)\,(0.01959)\,(2.228) = 4.596\,.$$

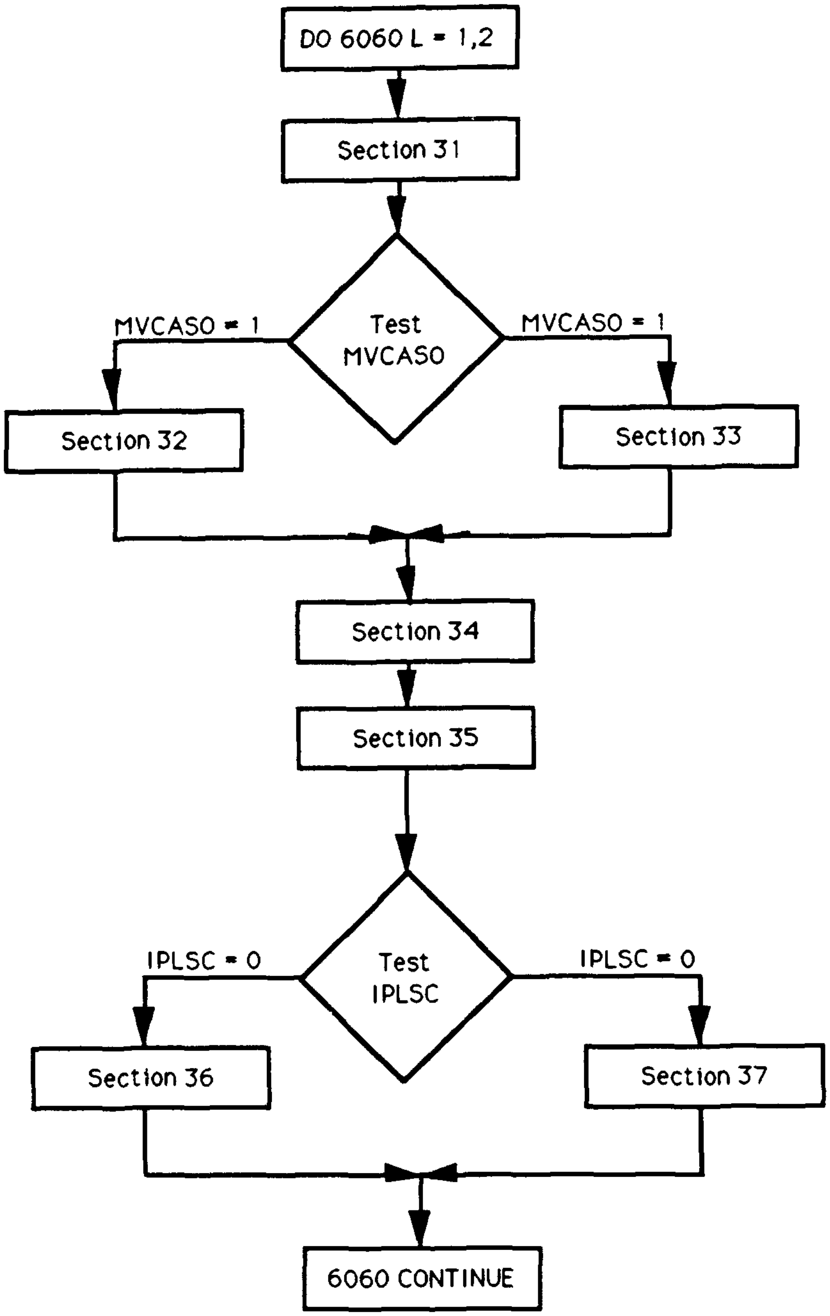
7. Section 30 (Lines 3892-3942)

This section concerns the consumption of supplies and resulting supply inventories; accordingly, it makes no calculations relevant to the numeric example presented here.

F. PART F (LINES 3943-4168)

1. Section 31 (Lines 3943-3953)

This section starts a relatively large do-loop (over side) which consists of Sections 31 through 37, inclusive (i.e., all of Parts F, G, and H). In any given cycle, only some of these sections will be processed—the choice depending on the values of the input variables MVCASO and IPLSC. The structure here is as shown in the following chart.



In the example here, all four cases will be considered, labeled as follows:

	IPLSC = 0	IPLSC = 1
MVCASO = 0	Case M0/0	Case M0/1
MVCASO = 1	Case M1/0	Case M1/1

The remainder of Section 31 just sets: (a) one meaningful working variable—II, (b) five meaningless working variables—N2, N3, N4, N5, and N6, and (c) one poorly named working variable—TEMP—that belongs in Section 32, not 31.

2. Section 32 (Lines 3954-4075)

As noted above, this section of the code is processed by GC only if the input MVCASO is not 1 (i.e., only if MVCASO is 0, 2, or 3).

a. Inputs and Outputs

Primary Section Inputs	Source
MVCASO	Model Input
WS(IW, L)	Section 6
WSI(IW,IS,L)	Section 6
PWAKW(IW,KW,L)	Section 23
PWDKW(IW,KW,L)	Section 23
ACSABA(IAC,IS,L)	Subroutine Input
PAAKW(IAC,KW,L)	Section 23
PADKW(IAC,KW,L)	Section 23
SSMALO(ISSM,IS,L)	Subroutine Input
PMAKW(ISSM,KW,L)	Section 23
PMDKW(ISSM,KW,L)	Section 23
VIWACF(IW,IS,L)	Section 24
VIWDCF(IW,IS,L)	Section 24
VLS(L)	Section 29
SFAPP(L)	Section 4
NUMINC(L)	Section 4
FICAS(2,L)	Model Input

Section Outputs	Next Relevant Use
SFAPP(L)	Section 42
NUMINC(L)	Section 42
VFACTOR	Section 34
GKGS(IW,KW,L)	Section 35
DGRD(IW)	Section 37
AKGS(IAC,KW,L)	Section 35

DAIR(IW)	Section 37
XMKGS(ISSM,KW,L)	N/A
DSSM(IW)	N/A
WLS(IW,IS,L)	Section 38

Discussion

Since (as noted above) the basic approach here is essentially backwards, the logic implementing this approach is necessarily somewhat convoluted. With one exception, this logic is discussed in conjunction with the numeric data below. The one exception concerns the input FICAS. This input is discussed in Reference [12] and, except for setting its value to 1.0, it will not be discussed further here.

b. Numeric Example

Relevant Section Inputs	Data	
MVCASO	0 (for Cases M0/0 & M0/1)	
WS(•,1)	100.	200.
WS(•,2)	40.	40.
WSI(•,1,1)	100.	200.
WSI(•,1,2)	40.	40.
PWAKW(1,•,1)	0.1000	0.1000
PWAKW(2,•,1)	0.0010	0.0010
PWDKW(1,•,2)	0.0667	0.1333
PWDKW(2,•,2)	0.0005	10.4762
ACSABA(1,1,•)	10.	20.
PAAKW(1,•,1)	1.0000	1.0000
PADKW(1,•,2)	0.0000	11.0000
VIWACF(•,1,1)	1.0000	0.0100
VIWDCF(•,1,2)	0.5166	0.7998
VLS(•)	5.192	4.596
SFAPP(•)	0.	0.
NUMINC(•)	0	0
FICAS(2,•)	1.	1.

Relevant

Loss-Related Section Outputs	Data: Losses on Side L = 1		Data: Losses on Side L = 2	
NUMINC(L)	1		1	
SFAPP(L)	0.5684		0.17284	
VFACTOR	0.5684		0.17284	
DGRD(•)	1.53	131.72	1.76	1.76
DAIR(•)	0	68.28	1.73	1.73
WLS(•,1,L)	1.53	200.00	3.49	3.49

Relevant KVS-Related Section Outputs	Data: Side L = 2 Killing Side 1		Data: Side L = 1 Killing Side 2	
GKGS(1,•,L)	1.52	1.654	1.73	1.73
GKGS(2,•,L)	0.01	130.063	0.03	0.03
AKGS(1,•,L)	0	68.283	1.76	1.76

Discussion

First, Section 32 computes how many target weapons by type would be killed by each type of shooting weapon, assuming the following:

(1) Each engagement made by each shooter is made against a target that both

- (a) is not simultaneously being engaged by another shooter, and
- (b) has not already been "killed" (before or) during the combat (in the cycle) being simulated.

(2) All "bullets pass in mid-air" in that all of the weapons involved participate in all of their engagements (as determined by the inputs ERTA and ERTD) before any shooter or either side is killed.

(3) The values input for these engagement rates and for the probabilities of kill per engagement are generally appropriate (i.e., are good enough for the analyses being made).

Given these assumptions and the data above, unscaled attrition to ground weapons in combat is calculated as indicated on Table III-3:

Table III-3. Unscaled Attrition Calculations

Shooting System Type	Number of Shooting Systems	Kill Rate Per Shooting System	Potential Kills	Target System Type	Target Side
Side 1 Shooting at Side 2					
Ground-1	100.	0.1000	10.0	Ground-1	2
		0.1000	10.0	Ground-2	2
Ground-2	200.	0.0010	0.2	Ground-1	2
		0.0010	0.2	Ground-2	2
Air-1	10.	1.0000	10.0	Ground-1	2
		1.0000	10.0	Ground-2	2
Side 2 Shooting at Side 1					
Ground-1	40.	0.0667	2.67	Ground-1	1
		0.1333	5.33	Ground-2	1
Ground-2	40.	0.0005	0.02	Ground-1	1
		10.4762	419.05	Ground-2	1
Air-1	20.	0.0000	0.00	Ground-1	1
		11.0000	220.00	Ground-2	1

These calculations yield the following "potential" killer-victim scoreboards and total attrition:

Shooting System Type on Side 1	Unscaled Kills On Side 2 Target System Type: Ground-1	Ground-2
Ground-1	10.0	10.0
Ground-2	0.2	0.2
Total Ground	10.2	10.2
Air-1	10.0	10.0
Grand Total	20.2	20.2

Shooting System Type on Side 2	Unscaled Kills On Side 1 Target System Type: Ground-1	Ground-2
Ground-1	2.67	5.33
Ground-2	0.02	419.05
Total Ground	2.69	424.38
Air-1	0.00	220.0
Grand Total	2.69	644.38

These results are, at best, "potential" because they are based on the three assumptions given above and, no matter how reasonable the data are (i.e., no matter how good

Assumption 3 is), Assumptions 1 and 2 above are questionable. Since Assumptions 1 and 2 each overstate attrition, the attrition results above are (if all else is acceptable) too high and should be reduced. In fact, the model does reduce this attrition, but it essentially does so by retaining Assumptions 1 and 2 while dropping Assumption (3).

To reduce this attrition, the model proceeds as follows. First, it computes the unscaled total value lost on each side as follows:

Target System Type	Antipotential Potential Value Per System	Unscaled Losses	Unscaled Value Lost
Targets on Side 1			
Ground-1	1.000	2.69	2.690
Ground-2	0.010	644.38	6.444
			9.134
Targets on Side 2			
Ground-1	0.5166	20.2	10.435
Ground-2	0.7998	20.2	16.591
			26.591

Second, the model assumes that the real total value lost on side L is given by VLS(L) as computed in Section 29. It then computes, for Side 1,

$$\text{VFACTOR} = \text{VLS}(1) \,/\, \text{Total Unscaled Value Lost on Side 1}$$

$$= 5.192/9.134 = 0.5684,$$

and it computes, for Side 2,

$$\text{VFACTOR} = \text{VLS}(2) \,/\, \text{Total Unscaled Value Lost on Side 2}$$

$$= 4.596/26.591 = 0.17284.$$

Next, the model assumes that the input intensity of the kill rates for Side 1 killing Side 2 is really too big by a factor of

$$1/0.17284 = 5.79,$$

and that the input intensity of the kill rates for Side 2 killing Side 1 is really too big by a factor of

$$1/0.5684 = 1.76.$$

Operating on this assumption, the model divides each of the unscaled kills computed above by these factors (i.e., scales these kills by VFACTOR) to obtain, with one

exception, what it assumes to be the actual losses for the combat being simulated. The one exception concerns checking to be sure not to "kill" more systems than there are present to be killed. Before considering this exception, however, the model scales the unscaled losses by the intensity factors just computed. In the example here, the model would now make the following calculations:

	Target System Type on Side 2					
	Ground-1			Ground-2		
Shooting System Type on Side 1	Unscaled Kills	Scale Factor	Tentative (Actual) Kills	Unscaled Kills	Scale Factor	Tentative (Actual) Kills
Ground-1	10.0	0.17284	1.73	10.0	0.17284	1.73
Ground-2	0.2	0.17284	.03	0.2	0.17284	.03
Total Ground	10.2		1.76	10.2		1.76
Air-1	10.0	0.17284	1.73	10.0	0.17284	1.73
Grand Total	20.2		3.49	20.2		3.49

	Target System Type on Side 1					
	Ground-1			Ground-2		
Shooting System Type on Side 2	Unscaled Kills	Scale Factor	Tentative (Actual) Kills	Unscaled Kills	Scale Factor	Tentative (Actual) Kills
Ground-1	2.67	0.5684	1.52	5.33	0.5684	3.03
Ground-2	0.02	0.5684	.01	419.05	0.5684	238.19
Total Ground	2.69		1.53	424.38		241.22
Air-1	0	0.5684	0	220.00	0.5684	125.05
Grand Total	2.69		1.53	644.38		366.27

The last set of calculations in Section 32 checks, weapon type by weapon type, whether the tentative number of kills just calculated is less than or equal to the number of weapons of that type present as given by WS(IW,L), not the number vulnerable to enemy air and ground weapons as given by WSI(IW,IS,L). This check is satisfied for three of the four type and side combinations in this example, so actual kills equal tentative kills for these types of ground weapons. This check fails for ground weapon type 2 on Side 1. Since, in this example, WS(2,1) = WSI(2,1,1), the code here scales the tentative losses of type 2 weapons on Side 1 by

$$\frac{\text{number present}}{\text{tentative number lost}} = \frac{200.00}{366.27} = 0.54605\ ,$$

which gives:

Shooting System Type on Side 2	Target System Type 2 on Side 1		
	Tentative Kills	(Second) Scale Factor	Resulting Actual Kills
Ground-1	3.03	0.54605	1.654
Ground-2	238.19	0.54605	130.063
Total Ground	241.22		131.717
Air-1	125.05	0.54605	68.283
Grand Total	366.27		200.000

The table below summarizes the first (unscaled losses to tentative losses) and second (tentative losses to actual losses) scalings for both types of weapons on both sides:

		Unscaled Losses		Tentative Losses		Actual Losses	
Type of Weapon	Anti-potential Potential Value	Number Lost	Value Lost	Number Lost	Value Lost	Number Lost	Value Lost
Side 1							
1	1.00	2.69	2.690	1.529	1.529	1.529	1.529
2	0.01	644.38	6.444	366.27	3.663	200.000	2.000
Total	--	--	9.134	--	5.192	--	3.529
Side 2							
1	0.5166	20.2	10.435	3.491	1.804	3.491	1.804
2	0.7998	20.2	16.156	3.491	2.792	3.491	2.792
Total	--	--	26.591	--	4.596	--	4.596

This portion of the example points out another potential problem with the code. In general, it seems that one would not want to scale simulated losses unless one were relatively sure that one wanted to make the resulting value lost equal to that computed in Section 29. But this example shows that the model does not necessarily scale losses to produce this equality. In the example here, the results for Side 2 do have the property that the numbers of weapons lost (by type) times the values of these weapons sum (over type) to VLS(2) as computed by Section 29—but the results for Side 1 do not have this property. In particular, for Side 1, Section 29 gives that

$$VLS(1) = 5.192\,,$$

yet

$$WLS(1)*VIWACF(1,1,1) + WLS(2)*VIWACF(2,1,1) =$$

$$1.529*1.00 + 200.000*0.01 = 3.529,$$

a difference (based on weapons lost) of almost 50 percent. This difference is so big that it changes Side 1 from losing almost 13 percent more value than Side 2 to losing about 23 percent less value than Side 2.

Several fixes are possible here. One would be to put the "sanity" check that WLS(IW,IS,L) $\leq$ WS(IW,L) (including the corresponding adjustments if not) before the scaling to match VLS(L)—i.e., to essentially copy lines 4051 through 4076 to just after line 3957, and to put a STOP statement in place of the current lines 4056 through 4074, inclusive. One of the problems with this fix concerns what to do if this STOP is encountered. In such a case a smaller time period could be used, but this could be quite tedious. Another fix would be to never set MVCASO = 0, and to use MVCASO = 1 instead—which is a step towards using the attrition logic in GC90.

3. Section 33 (Lines 4076-4168)

As noted above, this section of the code is processed only if the input MVCASO is 1.

a. Inputs and Outputs

Primary Section Inputs	Source
MVCASO (implicitly)	Model Input
WS(IW,L)	Section 6
WSI(IW,IS,L)	Section 6
PWAKW(IW,KW,L)	Section 23
PWDKW(IW,KW,L)	Section 23
SFGND(KP,I,L)	Model Input
ACSABA(IAC,IS,L)	Subroutine Input
PAAKW(IAC,KW,L)	Section 23
PADKW(IAC,KW,L)	Section 23
SFCAS(KP,I,L)	Model Input
SSMALO(ISSM,IS,L)	Subroutine Input
PMAKW(ISSM,KW,L)	Section 23
PMDKW(ISSM,KW,L)	Section 23
SFSSM(KP,I,L)	Model Input
Section Outputs	**Next Relevant Use**
GKGS(IW,KW,L)	Section 35

DGRD(IW)	Section 37
AKGS(IAC,KW,L)	Section 35
DAIR(IW)	Section 37
XMKGS(ISSM,KW,L)	N/A
DSSM(IW)	N/A
WLS(IW,IS,L)	Section 38

Discussion

Since GC processes either Section 32 or Section 33, but not both, to calculate WLS(IW,IS,L) for all relevant IW, IS, and L, it is appropriate to compare them. Note that many, but not all, of the inputs and outputs are the same for these two sections. Concerning inputs, the differences are as follows. Unlike Section 32, Section 33 makes no use of the (section) inputs VIWACF(IW,IS,L), VIWDCF(IW,IS,L), VLS(L), SFAPP(L), NUMINC(L) and FICAS(2,L). Conversely, unlike Section 33, Section 32 makes no use of the inputs SFGND(KP,I,L), SFCAS(KP,I,L), and SFSSM(KP,I,L). Concerning outputs, Sections 32 and 33 each produce data on losses (GKGS, DGRD, AKGS, DAIR, XMKGS, DSSM, and WLS); however, Section 32 (but not 33) also calculates new values for SFAPP(L), NUMINC(L), and VFACTOR.

b. Numeric Example

Relevant Section Inputs	Data	
MVCASO	1 (for Cases M1/0 and M1/1)	
WS(•,1)	100.	200.
WS(•,2)	40.	40.
WSI(•,1,1)	100.	200.
WSI(•,1,2)	40.	40.
PWAKW(1,•,1)	0.1000	0.1000
PWAKW(2,•,1)	0.0010	0.0010
PWDKW(1,•,2)	0.0667	0.1333
PWDKW(2,•,2)	0.0005	10.4762
ACSABA(1,1,•)	10.	20.
PAAKW(1,•,1)	1.0000	1.0000
PADKW(1,•,2)	0.0000	11.0000
SFGND(1,1,1)	1.	
SFGND(1,2,2)	1.	

SFCAS(1,1,1)	1.
SFCAS(1,2,2)	1.

Relevant Loss-Related Section Outputs	Data: Losses on Side L = 1		Data: Losses on Side L = 2	
DGRD(•)	2.69	131.717	10.2	10.2
DAIR(•)	0.	68.283	10.0	10.0
WLS(•,1,L)	2.69	200.000	20.2	20.2

Relevant KVS-Related Section Outputs	Data: Side L = 2 Killing Side 1		Data: Side L = 1 Killing Side 2	
GKGS(1,•,L)	2.67	1.654	10.0	10.0
GKGS(2,•,L)	0.02	130.063	0.2	0.2
AKGS(1,•,L)	0	68.283	10.0	10.0

Discussion

In this example, FICAS(2,L) = 1 for both L, SFGND(1,I,L) = SFAIR(1,I,L) = 1 for the relevant I and L, and DGRD(IW) ≤ WSI(IW,IS,L) whenever WLS(IW,IS,L) ≤ WS(IW,L). Therefore, the outputs of Section 33 (if MVCASO is 1) must necessarily equal the "unscaled" kills that would be computed by Section 32 if MVCASO were 0. Comparing the results here with the corresponding intermediate results of Section 32 shows that that is indeed the case in this example. Note that WLS is not scaled to match VLS here, and VLS is not recomputed to be consistent with WLS. Thus, if MVCASO = 1, the data reported for VLS by the model is (except by pure coincidence) inconsistent, and possibly quite inconsistent, with that reported by the model for WLS.

G. PART G (LINES 4169-4239)

1. Section 34 (Lines 4169-4210)

a. Inputs and Outputs

Primary Section Inputs	Source
EXNPMN(IW,KW,L)	Section 20
TEXNPM(IW,IS,L)	Section 20
EXPMN(IW,KW,ISM,IS,L)	Section 20

SMENG(IW,ISM,IS,L)	Section 20
SMSTK(ISM,IS,L)	Model Input
WSI(IW,IS,L)	Section 6
VFACTOR	Section 32

Section Outputs	Next Relevant Use
EXNPMN(IW,KW,L)	Subroutine Output
TEXNPM(IW,IS,L)	Subroutine Output
EXPMN(IW,KW,ISM,IS,L)	N/A
SMENG(IW,ISM,IS,L)	N/A
SMSTK(ISM,IS,L)	N/A

Discussion

The calculations here are trivial—Subroutine ADJUST can be described in five lines as follows:

```
    SUBROUTINE ADJUST(Z,N,V)
    DIMENSION Z(N)
    DO 10 J = 1,N
 10    Z(J) = Z(J) * V
    END
```

b. Numeric Example

Relevant Section Inputs	Data	
EXNPMN(1,•,1)	0.2000	0.2000
EXNPMN(2,•,1)	0.2000	0.2000
EXNPMN(1,•,2)	0.1333	0.2667
EXNPMN(2,•,2)	0.5238	10.4762
TEXNPM(•,1,1)	0.4000	0.4000
TEXNPM(•,1,2)	0.4000	11.0000
WSI(•,1,1)	100.	200.
WSI(•,1,2)	40.	40.

VFACTOR for
- Side 1, MVCASO = 0: 0.17284
- Side 2, MVCASO = 0: 0.5684
- Side 1, MVCASO = 1: Undefined
- Side 2, MVCASO = 1: Undefined

Relevant Section Outputs	Data			
	MVCASO = 0		MVCASO = 1	
EXNPMN(1,•,1)	0.03457	0.03457	Undefined	Undefined
EXNPMN(2,•,1)	0.03457	0.03457	Undefined	Undefined
EXNPMN(1,•,2)	0.07577	0.15159	Undefined	Undefined
EXNPMN(2,•,2)	0.29773	5.95467	Undefined	Undefined
TEXNPM(•,1,1)	0.06914	0.06914	Undefined	Undefined
TEXNPM(•,1,2)	0.22736	6.2524	Undefined	Undefined

2. Section 35 (Lines 4211-4239)

a. Inputs and Outputs

Primary Section Inputs	Source
GKGS(IW,KW,L)	Section 32 or 33
SGKGS(IW,KW,L)	Subroutine Input
AKGS(IAC,KW,L)	Section 32 or 33
SAKGS(IAC,KW,L)	Subroutine Input
XMKGS(ISSM,KW,L)	Section 32 or 33
SMKGS(ISSM,KW,L)	Subroutine Input

Section Outputs	Next Relevant Use
SGKGS(IW,KW,L)	Subroutine Output
SAKGS(IAC,KW,L)	Subroutine Output
SMKGS(ISSM,KW,L)	Subroutine Output

Discussion

This section simply accumulates the per-cycle values of GKGS, AKGS, and XMKGS into the cumulative (over all cycles) arrays SGKGS, SAKGS, and SMKGS, respectively.

b. Numeric Example

Relevant Section Inputs	Data			
	MVCASO = 0		MVCASO = 1	
GKGS(1,•,1)	1.73	1.73	10.0	10.0
GKGS(2,•,1)	0.03	0.03	0.2	0.2
GKGS(1,•,2)	1.52	1.654	2.67	1.654

GKGS(2,•,2)	0.01	130.063	0.02	130.063
AKGS(1,•,1)	1.73	1.73	10.0	10.0
AKGS(1,•,2)	0.	68.283	0.	68.283

SGKGS(IW,KW,L) = SAKGS(IAC,KW,L) = 0.0 for all relevant arguments.

Relevant Section Outputs	Data
SGKGS(IW,KW,L)	GKGS(IW,KW,L) as above for all relevant IW, KW, and L
SAKGS(1,KW,L)	AKGS(1,KW,L) as above for all relevant KW and L

Discussion

Cumulative killer-victim scoreboards are identical to the per-cycle killer-victim scoreboards for the first cycle, which is the case in the example here.

H. PART H (LINES 4240-4328)

1. Section 36 (Lines 4240-4309)

a. Inputs and Outputs

Primary Section Inputs	Source
IPLSC	Model Input
PDIV(ID)	Model Input
PCS(L)	Section 29
VGABAI(IS,L)	Section 25
VGDBAI(IS,L)	Section 25
VAABA(IS,L)	Section 26
VADBA(IS,L)	Section 26
VMABA(IS,L)	Section 26
VMDBA(IS,L)	Section 26
SCASUAL(I,IS,L)	Subroutine Input
PLST(L)	Section 4
TPDIV(L)	Section 4
CPLS(IS,IC)	Subroutine Input
FPCR(IC)	Model Input
PIARP(IC)	Subroutine Input

Section Outputs	Next Relevant Use
TPDIV(L)	Model Output
SCASUAL(I,IS,L)	Model Output
PLS(IS,L)	Section 43
PLST(1)	Model Output
CPLS(IS,IC)	Model Output
PDIV(ID)	Model Output
PIARP(IC)	Model Output

Discussion

As noted above, this section is processed only if the input IPLSC is 0.

b. Numeric Example

Relevant Section Inputs	Data	
IPLSC	0 (for Cases M0/0 and M1/0)	
PDIV(•)	3000.	800.
PCS(•)	0.01665	0.01959
VGABAI(1,1)	102.00	
VGDBAI(1,2)		105.31
VAABA(1,1)	100.00	
VADBA(1,2)		16.72
SCASUAL(1,•,1)	0.	0.
SCASUAL(2,•,2)	0.	0.
CPLS(1,•)	0.	0.
FPCR(•)	0.4	0.4
PIARP(•)	0.	0.

Relevant Section Outputs	Data	
TPDIV(•)	3000.	800.
SCASUAL(1,•,1)	43.08	7.91
SCASUAL(2,•,1)	6.84	7.76
PLS(1,•)	49.92	15.67
PLST(•)	49.92	15.67
CPLS(1,•)	49.92	15.57
PDIV(•)	2950.08	784.33
PIARP(•)	1180.03	313.73

Discussion

To simplify making comparisons, the data used for PDIV here are based on the assumption that each type of weapon on each side requires 10 people in the unit to fire and to support the firing of that weapon. Note that, for IPLSC = 0, the resulting personnel losses are the same for MVCASO = 0 as for MVCASO = 1. Indeed, given PDIV and PLS, the number of personnel lost on each side is independent of the numbers of weapons lost when IPLSC = 0.

2. Section 37 (Lines 4310-4328)

a. Inputs and Outputs

Primary Section Inputs	Source
IPLSC (implicitly)	Model Input
DGRD(IW)	Section 32 or 33
DAIR(IW)	Section 32 or 33
DSSM(IW)	Section 32 or 33
FTCWPL(IW,L)	Model Input
SCASUAL(I,IS,L)	Subroutine Input
Section Output	**Next Relevant Use**
SCASUAL(I,IS,L)	Model Output

Discussion

As noted above, this section is processed only if the input IPLCS is not 0 (i.e., IPLSC = 1). In particular, if this section is processed, then the array SCASUAL still has its (subroutine) input values, not the values that would have been computed in Section 36 (since that section would not have been processed). Additional outputs concerning personnel losses when IPLSC = 1 are calculated in Section 39.

b. Numeric Example

Relevant Section Inputs and Outputs	Data L = 1 MVCASO = 0		L = 1 MVCASO = 1		L = 2 MVCASO = 0		L = 2 MVCASO = 1	
IPLSC	1 (for Case M0/1)		1(for Case M1/1)		1(for Case M0/1)		1 (for Case M1/1)	
DGRD(•)	1.53	131.72	2.69	131.72	1.76	1.76	10.2	10.2
DAIR(•)	0.	68.28	0.	68.28	1.73	1.73	10.0	10.0
FICWPL(•)	3.	1.	3.	1.	2.	2.	2.	2.
SCASUAL(1,1,•)	136.31		139.79		3.52		40.8	
SCASUAL(2,1,•)	68.28		68.28		3.46		40.0	

Discussion

The underlying assumption for the data here is that three people are lost, on average, for each weapon of type 1 lost on Side 1, one person is lost for each weapon of type 2 lost on Side 1, and two people are lost for each weapon of either type lost on Side 2. Clearly, for IPLSC = 1, the resulting personnel losses depend directly on the numbers of weapons lost (and so depend on MVCASO as well as on other weapon-loss related inputs).

I. Part I (Lines 4329-4598)

1. Section 38 (Lines 4329-4358)

a. Inputs and Outputs

Primary Section Inputs	Source
WS(IW,L)	Section 6
WDIV(IW,ID)	Model Input
WLS(IW,IS,L)	Section 32 or 33
Section Output	**Next Relevant Use**
TEMP 1	Sections 39 and 40

Discussion

Lines 4329 through 4358 (Section 38) plus lines 4371 through 4426 (Section 40) form one logical section—the lines in between (Section 39, lines 4359-4370) are logically part of Section 37 as described above.

b. Numeric Example

Relevant Section Inputs		Data		
WS(•,1)		100.	200.	
WS(•,2)		40.	40.	
WDIV(•,1)		100.	200.	
WDIV(•,2)		40.	40.	

	MVCASO = 0		MVCASO = 1	
WLS(•,1,1)	1.53	200.00	2.69	200.00
WLS(•,1,2)	3.49	3.49	20.20	20.20

Relevant Section Outputs

	Data			
	MVCASO = 0		MVCASO = 1	
TEMP1 (L = 1)	1.53	200.00	2.69	200.00
TEMP1(L = 2)	3.49	3.49	20.20	20.20

Discussion

Since there is only one unit on each side in combat in this example, TEMP1 = WLS(IW,1,L) for all relevant IW and L.

2. Section 39 (Lines 4359-4370)

a. Inputs and Outputs

Primary Section Inputs	Source
IPLSC	Model Input
FTCWPL(IW,L)	Model Input
PDIV(ID)	Model Input
PLS(IS,IC)	Undefined
CPLS(IS,IC)	Subroutine Input
FPCR(IC)	Model Input
PIARP(IC)	Subroutine Input

Section Outputs	Next Relevant Use
PLS(IS,L)	Section 43
CPLS(IS,L)	Model Output
PDIV(ID)	Model Output
PIARP(IC)	Model Output

Discussion

This section is processed only if IPLSC = 1. As noted above, it is logically part of Section 37—it belongs there, not here.

b. Numeric Example

Relevant Section Inputs	Data	
IPLSC	1 (for Cases M0/1 and M1/1)	
FTCWPL(•,1)	3.	1.
FTCWPL(•,2)	2.	2.
PDIV(•)	3000.	800.
PLS(1,•)	Undefined	
CPLS(1,•)	0.	0.
FPCR(•)	0.4	0.4
PIARP(•)	0.	0.

Relevant Section Outputs

	Data			
	MVCASO = 0		MVCASO = 1	
PLS(1,•)	Undefined		Undefined	
CPLS(1,•)	204.59	6.98	208.07	80.80
PDIV(•)	2795.41	793.02	2791.93	719.20
PIARP(•)	1118.16	317.21	1116.77	287.68

Discussion

If the code properly initialized PLS, in this example it would have the same values that CPLS has at the end of the section.

3. Section 40 (Lines 4371-4426)

a. Inputs and Outputs

Primary Section Inputs	Source
TEMP1	Section 38
WDIV(IW,ID)	Model Input
CWLS(IW,IS,IC)	Subroutine Input
WLST(IW,L)	Section 4
WLS(IW,IS,L)	Section 32 or 33

Section Outputs	Next Relevant Use
WDIV(IW,ID)	Model Output
CWLS(IW,IS,IC)	Model Output
WLST(IW,L)	Model Output

Discussion

The calculations here are very simple but quite important. The number of weapons of type IW in unit ID that were lost in the combat being simulated, given by TEMP1 here, is subtracted from the number of weapons of that type in that unit at the start of the combat, WDIV(IW,ID), so that at the end of this section WDIV(IW,ID) gives the number of weapons of type IW still operational in unit ID at the end of this combat. WLST(IW,L) totals this number over all units in all sectors and CWLS(IW,IS,IC) cumulates this number over all units belonging to country IC in the sector in question.

b. Numeric Example

Relevant Section Inputs	Data			
	MVCASO = 0		MVCASO = 1	
TEMP1 (L=1)	1.53	200.00	2.69	200.00
TEMP1 (L=2)	3.49	3.49	20.20	20.20
WDIV(•,1)	100.	200.	100.	200.
WDIV(•,2)	40.	40.	40.	40.
CWLS(•,1,1)	0	0	0	0
CWLS(•,1,2)	0	0	0	0
WLS(•,1)	1.53	200.00	2.69	200.000
WLS(•,2)	3.49	3.49	20.20	20.20
WLST(•,1)	0	0	0	0
WLST(•,2)	0	0	0	0
WDIV(•,1)	98.47	0.00	97.31	0.00
WDIV(•,2)	36.51	36.51	19.80	19.80
CWLS(•,1,1)	1.53	200.00	2.69	200.00
CWLS(•,1,2)	3.49	3.49	20.20	20.20
WLST(•,1)	1.53	200.00	2.69	200.00
WLST(•,2)	3.49	3.49	20.20	20.20

Discussion

Since there is only one unit on each side anc nly one sector, WLS, WLST, and CWLS all have the same values for the first cycle.

4. Section 41 (Lines 4427-4501)

This section (apparently) concerns the destruction of supplies, and so (apparently) no calculations relevant to this numeric example are made here.

5. Section 42 (Lines 4502-4565)

As discussed in Chapter II, the code incorrectly represents the repair of damaged weapons. Until these problems are fixed, the model could be used in conjunction with the assumption that each weapon in combat is either damaged so lightly (if at all) that it is (or can be made to be) fully operational by the start of the next time period or that the weapon is damaged so severely in that combat that it cannot be made operational no matter how long the war being simulated lasts. This assumption is easy to incorporate. All relevant probabilities of kill should include probabilities of severe damage but not light damage, and the input PWATS should be set so that

$$PWATS(IW,I,L) = 1.0$$

for all IW, I, and L.

6. Section 43 (Lines 4566-4598)

As discussed in Chapter II, except for degenerate cases, WLDAS(IW,IS,L) is never calculated correctly by this code, and CDACS(IS,L) is calculated correctly here only if both FICAS(1,3-L) is 1.0 and IPLSC is 0 (in which case CDACS(IS,L) equals TEMPA divided by SUM, where TEMPA is as used on line 4297—thus, CDACS should be set there rather than (re)calculated here). Until this section of the code is fixed, all of its calculations and outputs (i.e., the values of WLDAS and CDACS) should be ignored, as should any results based on these calculations and outputs (i.e., the values computed for FWDCAS(IW,IR) and FPDCAS(IR)).

J. PART J (LINES 4599-4783)

1. Section 44 (Lines 4599-4607)

If MVCASO = 0, this section computes SFAPP(L) as an unweighted (except trivially) average of the scale factors for each sector as computed in Section 32. Since there is only one sector in this example, SFAPP(1) = 0.5684 and SFAPP(2) = 0.17284 if MVCASO = 0. IF MVCASO = 1, this section sets SFAPP(•) to essentially meaningless values, and it gives users of the model no warning of this.

2. Section 45 (Lines 4608-4673)

This section concerns writing outputs only; it makes no relevant calculations for the numeric example given here.

3. Section 46 (Lines 4674-4702)

As noted in the discussion of code Section 43 (in text Section 6 of Part I, above), the values of CDACS and WLDAS (computed there) and the values of FPDCAS and FWDCAS (computed here) are quite likely to be completely wrong and so should be ignored entirely.

4. Section 47 (Lines 4703-4723)

As discussed in Chapter II, the code in this section contains several potential problems (e.g., it does not consider AMLFD and AMNLAF) and, perhaps more importantly, it should not even be in GC. Since this section of the code is both erroneous and irrelevant to the calculation of attrition in GC, no numeric values are given for the example being presented.

5. Section 48 (Lines 4724-4783)

No calculations relevant to the numeric example given here are made in this (final) section of the code.

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APPENDIX

A FORTRAN LISTING OF SUBROUTINE GC

```
      SUBROUTINE GC
c
c     Change Number:   1
c
c     Date of Change:  29 Jan 1990
c
c     Subj of Change:  Common Merge
c
c     Desc of Change:  COMMCHRS has been merged into COMMCH.
c
c
c     Change Number:   2
c
c     Date of Change:  30 Jan 1990
c
c     Changed By:      Annette Wilson (PSE) per recommendation of
c                      Daniel Purcell (SYSCON)
c
c     Subj of Change:  Casualty Calculations
c
c     Desc of Change:  In order to enable the accurate calculation of
c                      casualties, the casualty calculations were added
c                      to the 6060 loop.
c
c
c     Change Number:   3
c
c     Date of Change:  1 Mar 1990
c
c     Changed By:      Annette Wilson
c
c     Subj of Change:  Precision Difference
c
c     Desc of Change:  Due to precision differences between the VAX and
c                      Sequent computers it was necessary to set weapon
c                      losses to 0.0 when they fall below 0.0001.
C
C     --- GC is the Ground Combat section of TACWAR.  Included in GC:
C             SSM assignments
C             Standard Allocation adjustment
C             Ground Kill Rate Matrices
C             Preferred and Non-Preferred Munitions
C             Allocations of weapon type vs. weapon type
C             Adjusted Allocation for Ground Weapons
C             Weapon Engagement Rate Adjustment
C             Kill Probability
C             Kill Potential
C             Munition Expenditures
C             Air and Missile Kill Rate Matrices
C             Ground, Air, and SSM values on attack and defense
C             Sector Attacker computation
C             Value Lost
C             Supplies Consumed and new supply inventories
C             Weapons lost by type
C             Personnel Losses
C             Weapons repairable after ground combat
```

```
C              Casualties and weapon losses per sortie
C              CAS munition expenditure
C
C
C/MODIFIED:     Scott Kesling    06-14-88
C              Potomac Systems Engineering
C              642-1000
C
C              Modify the Munition Expenditure matrix to contain Adjusted
C              values rather than maximum expenditures.
C
      INCLUDE 'INCL$DIR:PARAM.CMN'
      INCLUDE 'INCL$DIR:AGCOM.CMN'
      INCLUDE 'INCL$DIR:AGWK.CMN'
      INCLUDE 'INCL$DIR:BLANK.CMN'
      INCLUDE 'INCL$DIR:BLANKRS.CMN'
      INCLUDE 'INCL$DIR:BLANKSV.CMN'
      INCLUDE 'INCL$DIR:BLANKW.CMN'
      INCLUDE 'INCL$DIR:COMMCH.CMN'
C
      REAL VFACTOR
C
      INCLUDE 'INCL$DIR:GCFM.CMN'
      INCLUDE 'INCL$DIR:GCHIM.CMN'
      INCLUDE 'INCL$DIR:GCRS.CMN'
      INCLUDE 'INCL$DIR:GRDCOM.CMN'
      INCLUDE 'INCL$DIR:GRDRS.CMN'
      INCLUDE 'INCL$DIR:GRDSV.CMN'
      INCLUDE 'INCL$DIR:SUPCOM.CMN'
      INCLUDE 'INCL$DIR:TCCOM.CMN'
C
C+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      DIMENSION AAMA(LNAM,LNW,2),      AAMD(LNAM,LNW,2)
      DIMENSION AAMMA(LNMM,LNW,2),     AAMMD(LNMM,LNW,2)
      DIMENSION AAWA(LNW,LNW,2),       AAWD(LNW,LNW,2)
      DIMENSION AKGS(LNAC,LNW,2),      BSUM(LNADDR)
      DIMENSION CDACS(LNS,2),          DAIR(LNW)
      DIMENSION DGRD(LNW),             DSHAR(LND)
      DIMENSION DSSM(LNW),             EDAXSR(LND)
      DIMENSION EDDXSR(LND),           FRCAR(LNS,2)
      DIMENSION GKGS(LNW,LNW,2),       IHOLD(2)
      DIMENSION NUMINC(2),             PAAKW(LNAC,LNW,2)
      DIMENSION PADKW(LNAC,LNW,2),     PCS(2)
      DIMENSION PCSAR(LNS,2),          PEAAR(LND)
      DIMENSION PEDAR(LND),            PLS(LNS,2)
      DIMENSION PMAKW(LNSSM,LNW,2),    PMDKW(LNSSM,LNW,2)
      DIMENSION PPESAR(LNS,2),         PPSAR(LND)
      DIMENSION PWAKW(LNW,LNW,2),      PWDKW(LNW,LNW,2)
      DIMENSION RSUM(LNADDR)
      DIMENSION SEFAR(LND),            SFAPPT(2)
      DIMENSION SSMALO(LNSSM,LNS,2),   SUMMW(LNW)
      DIMENSION TSC(LNSPT,2),          TSL(LNS,LNSPT,2)
      DIMENSION TWS(2),                TYPCAF(LNLNFC)
      DIMENSION TYPCDF(LNLNFC),        VDAC(LND)
      DIMENSION VDDC(LND),             VGABAI(LNS,2)
      DIMENSION VGDBAI(LNS,2),         VLS(2)
      DIMENSION VIWAW(LNW,LNW,2),      VIWDW(LNW,LNW,2)
```

```
      DIMENSION WATSAR(LND)
      DIMENSION WDTSAR(LND),          WEAAR(LND)
      DIMENSION WEDAR(LND),           WLDAS(LNW,LNS,2)
      DIMENSION WS(LNW,2),            WVDAC(LND)
      DIMENSION WVDDC(LND),           XMKGS(LNSSM,LNW,2)
C
      DIMENSION BAWASM(LNW,LNW,LNSMN), BAWDSM(LNW,LNW,LNSMN)
      DIMENSION BSUMA(LNW,LNW,2),     BSUMD(LNW,LNW,2)
      DIMENSION BVWASM(LNW,LNW,LNSMN), BVWDSM(LNW,LNW,LNSMN)
      DIMENSION ISMFR(LNW,LNSMN,2),   NSMFR(LNSMN,2)
      DIMENSION PWAKSM(LNW,LNW,LNSMN,2)
      DIMENSION PWDKSM(LNW,LNW,LNSMN,2)
      DIMENSION PWSUMA(LNW,LNW,2),    PWSUMD(LNW,LNW,2)
      DIMENSION RAWASM(LNW,LNW,LNSMN), RAWDSM(LNW,LNW,LNSMN)
      DIMENSION RSUMA(LNW,LNW,2),     RSUMD(LNW,LNW,2)
      DIMENSION RVWASM(LNW,LNW,LNSMN), RVWDSM(LNW,LNW,LNSMN)
      DIMENSION SAWA(LNW,LNW,2),      SAWD(LNW,LNW,2)
      DIMENSION SSAMA(LNAM,LNW,2),    SSAMD(LNAM,LNW,2)
      DIMENSION SSAMMA(LNMM,LNW,2),   SSAMMD(LNMM,LNW,2)
      DIMENSION TNWIGT(LNGWT,2)
      DIMENSION BSHTRA(LNSMN),        BSHTRD(LNSMN)
      DIMENSION BTRGT(LNSMN),         RTRGT(LNSMN)
      DIMENSION RSHTRA(LNSMN),        RSHTRD(LNSMN)
      DIMENSION BSTRAS(LNSMN),        BSTRDS(LNSMN)
      DIMENSION RSTRAS(LNSMN),        RSTRDS(LNSMN)
      DIMENSION BBFRASM(LNW,LNW,LNSMN), BBFRDSM(LNW,LNW,LNSMN)
      DIMENSION RRFRASM(LNW,LNW,LNSMN), RRFRDSM(LNW,LNW,LNSMN)
      DIMENSION EERTA(LNW,LNPTP,2),   EERTD(LNW,LNPTP,2)
      DIMENSION AERTA(LNW,LNS,2),     AERTD(LNW,LNS,2)
      DIMENSION RSTVA(LNW,LNS,2),     RSTVD(LNW,LNS,2)
      DIMENSION WSGWVA(LNW,2),        WSGWVD(LNW,2)
      DIMENSION WTGWVA(LNW,2),        WTGWVD(LNW,2)
C
      INCLUDE 'INCL$DIR:TEST.CMN'
C+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
C
C      CHECK FOR CHANGE IN SECTOR ATTACKER DUE TO TIMET INPUT
C      IF ATTACKER HAS CHANGED. NEED TO CHECK POSTURES
C
      DO IS = 1,NS
        L = ISA(IS)
        IF (ICSA(IS) .EQ. 1 .AND. L .NE. 0) THEN
          IF(ICPDHD(L).EQ.1) THEN
            IF (L .EQ. 1) THEN
              IF((FEBA(IS).GT.FEBATZ(IS)).AND.(KPS(IS).EQ.3)) KPS(IS)=2
            ELSE
              IF((FEBA(IS).LT.FEBATZ(IS)).AND.(KPS(IS).EQ.3)) KPS(IS)=2
            END IF
          END IF
        END IF
      END DO

      IPRBST = IPRB
      IPRB = 0
      IF(KPSMGA(3) .NE. 1)GO TO 401
        WRITE(MOT,402)ICYCLE
402     FORMAT(1H1,///,1X,'TABLE 5.3  CYCLE',I4,//,10X,80(1H-),/,
```

```
     &  20X,'DETAILED GROUND CALCULATION OF VALUES BY ANTI-',
     &'POTENTIAL POTENTIAL TO FOLLOW',///)
        IPRB = 1
  401   CONTINUE
C
C-----------------------------------------------------------------------
C 2) CALCULATE SSM'S ASSIGNED TO ATTACK DIVISIONS IN ACTIVE BATTLE AREA
C-----------------------------------------------------------------------
C
      DO 240 L = 1,2
        ITAR = 10 + (LNSMTT * (L - 1))
        DO 230 ISSM = 1,NSSM(L)
          FRAC = (1.- FSSKIF(ISSM,1,L))
          DO 220 IS = 1,NS
            FRM = SSMPIM(ISSM,9,L) * SSMCON(ISSM,IS,L)
            IF(FRM.GT.SSMRDS(ISSM,L))FRM = SSMRDS(ISSM,L)
            SSMALO(ISSM,IS,L) = FRM * FRAC
            SSMRDS(ISSM,L) = SSMRDS(ISSM,L) - FRM
            CSSMST(ISSM,IS,ITAR) = CSSMST(ISSM,IS,ITAR) + FRM
            CSSMAR(ISSM,IS,ITAR) = CSSMAR(ISSM,IS,ITAR)
     &                             + SSMALO(ISSM,IS,L)
  220     CONTINUE
  230   CONTINUE
  240 CONTINUE
      IF(IPRB.EQ.1) THEN
        CALL DEBUG(MOT,'SSMCON',SSMCON,LNSSM,LNS,2)
        CALL DEBUG(MOT,'SSMALO',SSMALO,LNSSM,LNS,2)
        CALL DEBUG(MOT,'SSMRDS',SSMRDS,LNSSM,LNS,2)
      ENDIF
C  ---------------------------------------------------------------------
C  4) ADJUST THE STANDARD ALLOCATION.
C  ---------------------------------------------------------------------
      IF(ICYCLE .EQ. 1) THEN
        DO 450 L = 1,2
          N3 = NW(L)
          K = 3 - L
          N4 = NW(K)
          N6 = NMM(L)
          N5 = NAM(L)
          IF (L .EQ. 1) THEN
            DO KWGT = 1,LNGWT
              IF(PWSF(KWGT,K) .NE. 0.) THEN
                DO KP = 1,LNPTP
                  DO IW = 1,N3
                    BSAWA(IW,KWGT,KP) = BSAWA(IW,KWGT,KP) /
     &                                  PWSF(KWGT,K)
                    BSAWD(IW,KWGT,KP) = BSAWD(IW,KWGT,KP) /
     &                                  PWSF(KWGT,K)
                  ENDDO
                ENDDO
              ELSE
                DO KP = 1,LNPTP
                  DO IW = 1,N3
                    BSAWA(IW,KWGT,KP) = 0.0
                    BSAWD(IW,KWGT,KP) = 0.0
                  ENDDO
                ENDDO
```

```
              ENDIF
            ENDDO
          ELSE
            DO KWGT = 1,LNGWT
              IF(PWSF(KWGT,K) .NE. 0.) THEN
                DO KP = 1,LNPTP
                  DO IW = 1,N3
                    RSAWA(IW,KWGT,KP) = RSAWA(IW,KWGT,KP) /
     &                                  PWSF(KWGT,K)
                    RSAWD(IW,KWGT,KP) = RSAWD(IW,KWGT,KP) /
     &                                  PWSF(KWGT,K)
                  ENDDO
                ENDDO
              ELSE
                DO KP = 1,LNPTP
                  DO IW = 1,N3
                    RSAWA(IW,KWGT,KP) = 0.0
                    RSAWD(IW,KWGT,KP) = 0.0
                  ENDDO
                ENDDO
              ENDIF
            ENDDO
          ENDIF
C ------------------------------------------------------------------
          DO KWGT = 1,LNGWT
            IF (PWSF(KWGT,K) .GT. 0.) THEN
              DO IAM = 1,N5
                SAMA(IAM,KWGT,L) = SAMA(IAM,KWGT,L) / PWSF(KWGT,K)
                SAMD(IAM,KWGT,L) = SAMD(IAM,KWGT,L) / PWSF(KWGT,K)
              ENDDO  ! IAM
              DO IMM = 1,N6
                SAMMA(IMM,KWGT,L) = SAMMA(IMM,KWGT,L) / PWSF(KWGT,K)
                SAMMD(IMM,KWGT,L) = SAMMD(IMM,KWGT,L) / PWSF(KWGT,K)
              ENDDO  ! IMM
            ELSE
              DO IAM = 1,N5
                SAMA(IAM,KWGT,L) = 0.0
                SAMD(IAM,KWGT,L) = 0.0
              ENDDO  ! IAM
              DO IMM = 1,N6
                SAMMA(IMM,KWGT,L) = 0.0
                SAMMD(IMM,KWGT,L) = 0.0
              ENDDO
            ENDIF
          ENDDO  ! KWGT
  450   CONTINUE
        ENDIF
C-----------------------------------------------------------------
C  INITIALIZATION OF 2.10 ARRAY VARIABLES
C-----------------------------------------------------------------
        DO L = 1,2
          TPDIV(L) = 0
          PLST(L) = 0
          N3 = NW(L)
          DO IW = 1,N3
            WLST(IW,L) = 0
            WST(IW,L) = 0
```

```
          ENDDO
        ENDDO
C-------------------------------------------------------------------
C  5) CHECK FOR COMBAT DEPLOYMENT CHANGES THIS CYCLE
C-------------------------------------------------------------------
C
        DO 505 L = 1,2
          SFAPPT(L) = SFAPP(L)
          IF (SFAPPT(L) .EQ. 0.0) SFAPPT(L) = 1.0
          NUMINC(L) = 0
          SFAPP(L) = 0.0
  505 CONTINUE
        DO 9999 IS = 1,NS
          DO 500 L = 1,2
            IHOLD(L) = 0
            IWDRAW(IS,L) = 0
            IF (ICMST(IS,L) .NE. 0 ) THEN
              IF (ISA(IS) .EQ. 0) THEN
                ICHECK = ITA
              ELSE
                ICHECK = ISA(IS)
              ENDIF
              IF (ICHECK .EQ. 1) THEN
                IHOLD(L) = 1
              ELSE
                IWDRAW(IS,L) = 1
              ENDIF
            ENDIF
  500     CONTINUE
          IF (IPRB .EQ. 1) THEN
            WRITE (MOT,1) ICYCLE,IS
    1       FORMAT('1',//10X,'GC CALCULATIONS FOR CYCLE',I4,4X,
     &             'SECTOR',I3,///)
            WRITE(MOT,131)
            WRITE(MOT,10) (IHOLD(L),L = 1,2),(IWDRAW(IS,L),L = 1,2)
          ENDIF
C
C    -------------------------------------------------------------------
C 10) COMPUTE PERCENT RED GROUND KILLS BLUE, PERCENT BLUE GROUND KILLS
C     RED.
C    -------------------------------------------------------------------
C GET THE TERRAIN TYPE IN THE SECTOR. THIS IS USED AS AN INDEX INTO THE
C INTENSITY ARRAYS FRRING,FRRINA,FRRINH. THESE ARRAYS ARE USED TO ADJUST
C THE NUMBER AND MIX OF GROUND WEAPONS DUE TO "FAIR", KTI=2, OR "POOR",
C KTI=3 TERAIN.....
C
        KTI = KTER(IS)
C
C FIND THE SECTOR ATTACKER; FOR THE INITIAL OPENING THE SECTOR ATTACKER
C IS SET BY DATA BASE INPUT TO 'ISA'. THIS IS USED TO GET THE POSTURE
C INDEX INTO THE INTENSITY ARRAYS.
C
        ISATT = ISAT(ISA(IS),IS)
        IF (ISATT .NE. ISAP(IS)) THEN  ! SECTOR ATTACKERS HAVE CHANGED
          IF (ICSA(IS) .NE.1) KPS(IS) = 1
        ENDIF
C
```

```
C NOW GET THE POSTURE INDEX
C
      KP = KPS(IS)
      N2 = 0
      DO 1020 L = 1,2
        KPI = KP
        IF (L .EQ. ISATT) KPI = 1         !L IS SECTOR ATTACKER
        N1 = 1 + N2
        N2 = N2 + NDS(IS,L)
        N3 = NW(L)
        DO IW = 1,N3
          WS(IW,L) = 0.
          WSI(IW,IS,L) = 0.
        ENDDO
        IF (NDS(IS,L) .GT. 0) THEN
          DO 1015 IDS = N1,N2
C
C ONLY COMPUTE FOR THE UNITS IN CONTACT
C
            JDS = IDLABA(IDS,IS)
            IT = ITD(JDS)
C
C MAKE SURE NO HIGHER ECHELON UNITS ARE ON THE FEBA
C
            IF (IT .EQ. -1) GOTO 1015
C
C COMPUTE HOW FAR THE UNIT IS FROM THE FEBA, FOR WEAPONS PHASE IN.
C
            DIST = ABS(FEBA(IS) - CDVLOC(JDS))
            FRACW = (DFBACT(L) - DIST)/DFBACT(L)
C
C FRACW IS EQUAL TO THE FRACTION OF THE UNITS WEAPONS WHICH ARE IN
C CONTACT WHEN THE UNIT IS A DISTANCE OF DIST FROM THE FEBA. THIS
C FACTOR IS USED FOR DIRECT FIRE WEAPONS. WEAPONS SYSTEMS
C SUCH AS HELOS AND ARTILLERY ARE TREATED AS AN ALL OR NOTHING
C CALCULATION. WHEN THESE WEAPONS ARE WITHIN THIER ENGAGEMENT RANGE
C THEN ALL OF THEM ARE INCLUDED IN THE CALCULATION OTHERWISE NONE
C OF THEM ARE INCLUDED. THIS ENGAGEMENT RANGE IS GIVEN BY THE VARIABLE
C ERGMAX(IW,L).
C
C NOTE:  WHEN ERGMAX(IW,L)=0 INDIRECT FIRE WEAPONS ARE TREATED LIKE
C DIRECT FIRE WEAPONS WITH AN INCREASING FRACTION OF THE UNITS WEAPONS
C COMING IN CONTACT AS THE UNIT MOVES CLOSER TO THE FEBA.
C
C COMPUTE THE NUMBER OF SIDE L WEAPONS IN THE SECTOR (WS), ALSO COMPUTE
C THE NUMBER OF SIDE L WEAPONS IN THE SECTOR WHICH ARE TARGETS FOR GROUND
C WEAPONS (WSI). FRRING IS THE REDUCTION FACTOR OF WEAPONS BASED ON TER-
C RAIN, POSTURE AND UNIT TYPE. FRRING IS A PERCENTAGE OF THE TOE NUMBER
C OF WEAPONS WHICH CAN FIT IN THE RESTRICTED TERRAIN, SO, TO GET THE NUM-
C BER OF WEAPONS THAT ARE TARGETS YOU MUST TAKE THE MINIMUM OF THE NUMBER
C OF WEAPONS ON-HAND AND THE NUMBER THAT CAN FIT.
C
C THE IWTIWC ARRAY HOLDS THE WEAPON TYPES OF EACH CLASS OF WEAPON
C THE ONLY CLASS OF WEAPONS AFFECTED BY THE RESTRICTIVE TERRAIN
C IN TERMS OF THE NUMBER OF SHOOTERS AND TARGETS AVAILABLE ARE THE
C GROUND-TO-GROUND WEAPON SYSTEMS WHICH IS WEAPON CLASS 1.
C
```

```
              DO INWPC = 1,NWTIWC(1,L)
                IW           = IWTIWC(INWPC,1,L)
                WS(IW,L)     = WS(IW,L) + WDIV(IW,JDS) * FRACW
                WTFIT        = FRRING(IT,KPI,KTI) * TWD(IW,IT)  !#WPNS THAT FIT
                WSI(IW,IS,L) = WSI(IW,IS,L) +
     &                         (AMIN1(WDIV(IW,JDS),WTFIT) * FRACW)
              ENDDO
C
C ADD IN REST OF WEAPONS TYPES (NOT AFFECTED BY TERRAIN)
C THESE ARE WEAPON CLASSES:
C
C    2 => ARTILLERY
C    3 => HELOS
C    4 => ANTI-AIR
C
              DO IWPC = 2,LNWPC
                IF (NWTIWC(IWPC,L) .GT. 0) THEN
                  DO INWPC = 1,NWTIWC(IWPC,L)
                    IW = IWTIWC(INWPC,IWPC,L)
                    IF (ERGMAX(IW,L) .EQ. 0.) THEN
                      WS(IW,L)     = WS(IW,L) + WDIV(IW,JDS) * FRACW
                      WSI(IW,IS,L) = WSI(IW,IS,L) + WDIV(IW,JDS) * FRACW
                    ELSE IF (DIST .LE. ERGMAX(IW,L)) THEN
                      WS(IW,L)     = WS(IW,L)  + WDIV(IW,JDS)
                      WSI(IW,IS,L) = WSI(IW,IS,L) + WDIV(IW,JDS)
                    ENDIF
                  ENDDO   ! WEAPONS IN THIS CLASS
                ENDIF     ! IF WEAPONS IN THIS CLASS
              ENDDO       ! CLASSES NOT DIRECTLY AFFECTED BY TERRAIN
 1015       CONTINUE
          ENDIF
 1020 CONTINUE
        DO 1522 L = 1,2
          N3 = NW(L)
          TWS(L) = 0.
          DO 1521 IW = 1,N3
            TWS(L) = TWS(L) + WS(IW,L)
            WLS(IW,IS,L) = 0.
            WLDAS(IW,IS,L) = 0
            WST(IW,L) = WST(IW,L) + WS(IW,L)
 1521     CONTINUE
          PLS(IS,L) = 0.
          CDACS(IS,L) = 0
 1522 CONTINUE
        FRAD(IS) = 999.
        DO 1523 L = 1,2
          VGABA(IS,L)  = 0.
          VGDBA(IS,L)  = 0.
          VGABAI(IS,L) = 0.
          VGDBAI(IS,L) = 0.
          VAABA(IS,L)  = 0.
          VADBA(IS,L)  = 0.
 1523 CONTINUE
        IF (TWS(1) .LE. 0.0.AND.TWS(2) .LE. 0.0) GO TO 9999
        DO 1524 L = 1,2
          IF (TWS(L) .NE. 0) GO TO 1524
          K = 3 - L
```

```
            ISA(IS) = K
            IF (KSTOPB.EQ.1.AND.ISA(IS).EQ.1.AND.FEBA(IS).LE.FEBATZ(IS))
     1        ISA(IS) = -3
            VGABA(IS,K) = 1.0
            VAABA(IS,K) = 1.0
            VGABAI(IS,K) = 1.0
            VGDBAI(IS,K) = 1.0
 1524   CONTINUE
        IF (TWS(1).LE.0.0.OR.TWS(2).LE.0.0) GO TO 9999
C
C +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
C                  MVCASO = 0 USE APP RECALCULATE ALLOCATIONS EVERY
C                               CYCLE
C                           1 USE SCALING FACTORS (DONT USE APP)
C                           2 USE APP, CALCULATE ALLOCATIONS FIRST
C                               CYCLE ONLY
C                           3 USE APP WITH STANDARD ALLOCATIONS
C +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
C
        IF (MVCASO .EQ. 2 .AND. ICYCLE .GT. 1) GOTO 2500
        DO 1050 L = 1,2
          II = 3 - L
          N3 = NW(L)
          N4 = NW(II)
C ---------------------------------------------------------------------
C         COMPUTE SMART/PREFERRED MUNITIONS FIRING REQUIREMENTS
C ---------------------------------------------------------------------
          DO IW = 1,N3
            DO ISM = 1,NSM(II)
              ISMFR(ISM,IW,II) = 0
            ENDDO
          ENDDO
          IF (ISMUS(II) .NE. 0) THEN
            DO ISM = 1,NSM(II)
              NSMFR(ISM,II) = 0
              IF (SMSTK(ISM,IS,II) .GT. 0.0) THEN
                IF (NSMT(ISM,II) .GT. 0) THEN
                  DO INSMT=1,NSMT(ISM,II)
                    IGWT = ISMT(INSMT,ISM,II)
                    DO INWTIGT = 1,NWTIGT(IGWT,L)
                      IW = IWTIGT(INWTIGT,IGWT,L)
                      IF (WSI(IW,IS,L) .GT. 0.0) THEN
                        NSMFR(ISM,II) = NSMFR(ISM,II) + 1
                        ISMFR(NSMFR(ISM,II),ISM,II) = IW
                      ENDIF  ! IF THERE ARE TARGETS PRESENT
                    ENDDO
                  ENDDO     ! POSSIBLE TARGETS FOR THIS PREFERRED MUNITION
                ENDIF       ! IF TARGETS FOR THIS PREFERRED MUNITION
              ENDIF         ! IF THERE ARE PREFERRED MUNITION AVAILABLE
            ENDDO           ! PREFERRED MUNITION
          ENDIF
            IF (KPSMGA(15) .EQ. 1 .AND. ISMUS(II) .EQ. 1) THEN
              WRITE (MOT,1009)
 1009         FORMAT(1X,'WEAPON TYPES WHICH WILL FIRE PREFERRED ',
     &                  'MUNITIONS')
              DO ISM = 1,NSM(II)
                IF (NSMW(ISM,II) .GT. 0) THEN
```

```
                  DO INSMW=1,NSMW(ISM,II)
                    IW = ISMW(INSMW,ISM,II)
                    WRITE (MOT,1008)ISM,
     &                 (AWT(IW,IWORD,II),IWORD=1,2),WSI(IW,IS,II)
                  ENDDO
                ENDIF
              ENDDO
 1008         FORMAT (1X,I3,1X,2A4,1X,F10.3)
              WRITE (MOT,1007) ICYCLE,II
 1007         FORMAT (/,' MUNITIONS AVAILABLE  CYCLE',I4,'  SIDE',I4)
              DO 1005 ISM = 1,NSM(II)
 1005         WRITE (MOT,1006) SMSTK(ISM,IS,II)
 1006         FORMAT (1X,F10.3)
            ENDIF
C+-----------------------------------------------------------+
C+                                                          +
C+ IF SIDE II IS THE SECTOR ATTACKER, THEN HE IS ATTACKING A +
C+ DEFENDER IN POSTURE KPS. WHEN HE GOES ON THE DEFENSE HE   +
C+ WILL BE DEFENDING IN POSTURE 1 (DELAY).                   +
C+                                                          +
C+ IF SIDE II IS THE DEFENDER, THE HE IS DEFENDING IN        +
C+ POSTURE KPS. WHEN HE GOES ON THE ATTACK, HE WILL BE       +
C+ ATTACKING A DEFENDER IN POSTURE 1 (DELAY).                +
C+                                                          +
C+-----------------------------------------------------------+
            IF (II .EQ. ISATT) THEN   ! SIDE II IS THE ATTACKER
              KPD = 2
              KPA = KPS(IS)
            ELSE                      ! SIDE II IS THE DEFENDER
              KPA = 2
              KPD = KPS(IS)
            ENDIF
C+------------------------------------------------------------------+
C+                                                                 +
C+ BREAK OUT ALLOCATIONS BY GENERIC WEAPON TYPE TO BE BY WEAPON     +
C+ TYPE.                                                           +
C+                                                                 +
C+------------------------------------------------------------------+
C+                                                                 +
C+ COMPUTE THE TOTAL NUMBER OF WEAPONS IN EACH GENERIC WEAPON       +
C+ CATEGORY.                                                       +
C+                                                                 +
C+------------------------------------------------------------------+
C
          DO IGWT = 1,LNGWT
C
C    CHECK TO SEE IF THERE ARE WEAPON TYPES IN THIS GENERIC CATEGORY
C
            IF (NWTIGT(IGWT,L) .GT. 0) THEN
              TNWIGT(IGWT,L) = 0.
              DO IWTGT = 1,NWTIGT(IGWT,L)
                IW             = IWTIGT(IWTGT,IGWT,L)
                TNWIGT(IGWT,L) = TNWIGT(IGWT,L) + WSI(IW,IS,L)
              ENDDO
            ENDIF
          ENDDO
C
```

```
C+------------------------------------------------------------------------+
C+                                                                         +
C+ COMPUTE THE ALLOCATION OF WEAPON TYPE VS WEAPON TYPE.                  +
C+                                                                         +
C+ THE ALLOCATION OF WEAPON TYPE VS WEAPON TYPE IS COMPUTED FROM THE      +
C+ ALLOCATION OF WEAPON TYPE VS GENERIC WEAPON CATEGORY:                  +
C+                                                                         +
C+   THE ALLOCATION VS A WEAPON TYPE IS THE ALLOCATION VS THE GENERIC     +
C+   WEAPON CATEGORY TIME THE PERCENT THAT THE WEAPON TYPE CONTRIBUTES    +
C+   TO THE TOTAL NUMBER OF WEAPONS IN THE GENERIC WEAPON CATEGORY.       +
C+                                                                         +
C+  IE:                                                                    +
C+                                                                         +
C+   FOR GENERIC WEAPON CATEGORY(IGWT) 4 (TANKS):                          +
C+     SPPSE: WEAPON TYPES 4 & 15 ARE OF GWT 4                             +
C+            AND THAT TYPE 4 WEAPONS CONTRIBUTE 80% OF GWT 4              +
C+            AND THAT TYPE 15 WEAPONS CONTRIBUTE 20% OF GWT 4             +
C+            AND THAT THE ALLOCATION OF WT 1 VS GWT 4 = .2                +
C+                                                                         +
C+  THEN:                                                                  +
C+                                                                         +
C+   THE RESULTING ALLOCATION OF WT 1 VS WT 4 IS:                          +
C+       .2 * .8 = .16                                                     +
C+   THE RESULTING ALLOCATION OF WT 1 VS WT 15 IS:                         +
C+       .2 * .2 = .04                                                     +
C+                                                                         +
C+   THERE IS A 20% ALLOCATION VERSUS TANKS OF WHICH                       +
C+        16% IS VERSUS TANKS OF TYPE 4                                    +
C+   AND   4% IS VERSUS TANKS OF TYPE 15                                   +
C+                                                                         +
C+------------------------------------------------------------------------+
C
C+------------------------------------------------------------------------+
C+                                                                         +
C+ COMPUTE THE PERCENTAGE THAT EACH WEAPON TYPE CONTRIBUTES TO THE        +
C+ NUMBER OF WEAPONS IN THE GENERIC WEAPON CATEGORY OF WHICH IT IS A      +
C+ MEMBER.                                                                 +
C+                                                                         +
C+------------------------------------------------------------------------+
C
         IF (II .EQ. 1) THEN
           DO IW = 1,N3
             IGWT = LNKWPT(IW,L)
             PWIC = 1.
             IF (IGWT .GT. 0) THEN
               IF (TNWIGT(IGWT,L) .GT. 0.) THEN
                 PWIC = WSI(IW,IS,L) / TNWIGT(IGWT,L)
               ENDIF
             ELSE
               IGWT = IW
             ENDIF
             DO JW = 1,N4
               SAWA(JW,IW,II) = PWIC * BSAWA(JW,IGWT,KPA)
               SAWD(JW,IW,II) = PWIC * BSAWD(JW,IGWT,KPD)
               DO ISM = 1,NSM(1)
                 BBFRASM(JW,IW,ISM) = PWIC * BFRASM(JW,IGWT,ISM)
                 BBFRDSM(JW,IW,ISM) = PWIC * BFRDSM(JW,IGWT,ISM)
```

```
                ENDDO
              ENDDO
              DO IAM = 1,NAM(II)
                SSAMA(IAM,IW,II) = PWIC * SAMA(IAM,IGWT,II)
                SSAMD(IAM,IW,II) = PWIC * SAMD(IAM,IGWT,II)
              ENDDO
              DO IMM = 1,NMM(II)
                SSAMMA(IMM,IW,II) = PWIC * SAMMA(IMM,IGWT,II)
                SSAMMD(IMM,IW,II) = PWIC * SAMMD(IMM,IGWT,II)
              ENDDO
            ENDDO
          ELSE
            DO IW = 1,N3
              IGWT = LNKWPT(IW,L)
              PWIC = 1.
              IF (IGWT .GT. 0) THEN
                IF (TNWIGT(IGWT,L) .GT. 0.) THEN
                  PWIC = WSI(IW,IS,L) / TNWIGT(IGWT,L)
                ENDIF
              ELSE
                IGWT = IW
              ENDIF
              DO JW = 1,N4
                SAWA(JW,IW,II) = PWIC * RSAWA(JW,IGWT,KPA)
                SAWD(JW,IW,II) = PWIC * RSAWD(JW,IGWT,KPD)
                DO ISM = 1, NSM(2)
                  RRFRASM(JW,IW,ISM) = PWIC * RFRASM(JW,IGWT,ISM)
                  RRFRDSM(JW,IW,ISM) = PWIC * RFRDSM(JW,IGWT,ISM)
                ENDDO
              ENDDO
              DO IAM = 1,NAM(II)
                SSAMA(IAM,IW,II) = PWIC * SAMA(IAM,IGWT,II)
                SSAMD(IAM,IW,II) = PWIC * SAMD(IAM,IGWT,II)
              ENDDO
              DO IMM = 1,NMM(II)
                SSAMMA(IMM,IW,II) = PWIC * SAMMA(IMM,IGWT,II)
                SSAMMD(IMM,IW,II) = PWIC * SAMMD(IMM,IGWT,II)
              ENDDO
            ENDDO
          ENDIF        ! SIDE
          IF (MVCASO .EQ. 3) THEN
            DO IW = 1,N3
              DO JW = 1,N4
                AAWA(JW,IW,II) = SAWA(JW,IW,II)
                AAWD(JW,IW,II) = SAWD(JW,IW,II)
              ENDDO
            ENDDO
          ELSE
C
C  COMPUTE THE ADJUSTED ALLOCATIONS OF SIDE II'S WEAPONS ON THE ATTACK
C  AND ON THE DEFENSE AGAINST SIDE L'S WEAPONS, BASED ON THE MIX OF
C  WEAPONS IN THIS SECTOR.
C
            DO 1035 JW = 1,N4    !SIDE II'S WEAPONS
              SUMA = 0.
              SUMD = 0.
              DO 1025 IW = 1,N3  !SIDE L'S WEAPONS
```

```
                AAWA(JW,IW,II) = 0.
                AAWD(JW,IW,II) = 0.
                SUMA = SUMA + SAWA(JW,IW,II) * WSI(IW,IS,L)
                SUMD = SUMD + SAWD(JW,IW,II) * WSI(IW,IS,L)
 1025         CONTINUE
              IF (SUMA .GT. 0.) THEN
                DO 1026 IW = 1,N3
                  AAWA(JW,IW,II) = (SAWA(JW,IW,II) * WSI(IW,IS,L))/SUMA
 1026           CONTINUE
              ENDIF
              IF (SUMD .GT. 0.) THEN
                DO 1027 IW = 1,N3
                  AAWD(JW,IW,II) = (SAWD(JW,IW,II) * WSI(IW,IS,L))/SUMD
 1027           CONTINUE
              ENDIF
 1035       CONTINUE
          ENDIF
C+------------------------------------------------------------------------
C+ CYCLE-BY-CYCLE DYNAMIC ADJUSTMENT OF WEAPON ENGAGEMENT RATES
C+------------------------------------------------------------------------
C         IF (ICYCLE .EQ. 1) THEN
           DO KP = 1,LNPTP
             DO JW = 1,N4
               EERTA(JW,KP,II) = ERTA(JW,KP,II)
               EERTD(JW,KP,II) = ERTD(JW,KP,II)
             ENDDO
           ENDDO
C         ELSE
C          DO JW = 1,N4
C            WTGWVA(JW,II) = 0.0
C            WTGWVD(JW,II) = 0.0
C            DO IW = 1,N3
C              WTGWVA(JW,II) = WTGWVA(JW,II) + AAWA(JW,IW,II) *
C    &                         WSI(IW,IS,L) * VIWDCF(IW,IS,L)
C              WTGWVD(JW,II) = WTGWVD(JW,II) + AAWD(JW,IW,II) *
C    &                         WSI(IW,IS,L) * VIWACF(IW,IS,L)
C            ENDDO
C            WSGWVA(JW,II) = VIWACF(JW,IS,II) * WSI(JW,IS,II)
C            WSGWVD(JW,II) = VIWDCF(JW,IS,II) * WSI(JW,IS,II)
C          ENDDO
C          DO JW = 1,N4
C            IF (WTGWVA(JW,II) .GT. .001) THEN
C              RSTVA(JW,IS,II) = WSGWVA(JW,II) / WTGWVA(JW,II)
C            ENDIF
C            IF (WTGWVD(JW,II) .GT. .001) THEN
C              RSTVD(JW,IS,II) = WSGWVD(JW,II) / WTGWVD(JW,II)
C            ENDIF
C          ENDDO
C          DO JW = 1,N4
C            CALL CVFW (NVERTA(JW,II),XAERTA(1,JW,II),YAERTA(1,JW,II),
C    &                  RSTVA(JW,IS,II),AERTA(JW,IS,II))
C            CALL CVFW (NVERTD(JW,II),XAERTD(1,JW,II),YAERTD(1,JW,II),
C    &                  RSTVD(JW,IS,II),AERTD(JW,IS,II))
C          ENDDO
C          DO KP = 1,LNPTP
C            DO JW = 1,N4
C              EERTA(JW,KP,II) = ERTA(JW,KP,II) * AERTA(JW,IS,II)
```

```
C               EERTD(JW,KP,II) = ERTD(JW,KP,II) * AERTD(JW,IS,II)
C             ENDDO
C           ENDDO
C         ENDIF         ! IF FIRST CYCLE
C ---------------------------------------------------------------------
C  SET ALLOCATION FOR WEAPONS USING SMART (PREFERRED) AND NON-PREFERRED
C  MUNITIONS
C ---------------------------------------------------------------------
        DO ISM = 1,NSM(II)
          DO IW = 1,N3
            DO JW = 1,N4
              BAWASM(JW,IW,ISM) = 0.
              BAWDSM(JW,IW,ISM) = 0.
              RAWASM(JW,IW,ISM) = 0.
              RAWDSM(JW,IW,ISM) = 0.
              BVWASM(JW,IW,ISM) = 0.
              BVWDSM(JW,IW,ISM) = 0.
              RVWASM(JW,IW,ISM) = 0.
              RVWDSM(JW,IW,ISM) = 0.
            ENDDO
          ENDDO
        ENDDO
        IF (II .EQ. 1) THEN
          DO ISM = 1,NSM(II)
C
C CHECK TO SEE IF THERE ARE POSSIBLE FIRERS AND TARGETS FOR
C PREFFERED MUNITION ISM
C
            IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
C
C THE ARRAY ISMW HOLDS THE WEAPONS TYPES WHICH MAY FIRE PREFERRED
C MUNITION ISM.
C
              DO INSMW = 1, NSMW(ISM,II)
                JW = ISMW(INSMW,ISM,II)
C
C CHECK TO SEE IF THERE ARE ANY OF THE FIRERS IN CONTACT
C
                IF (WSI(JW,IS,II) .GT. 0.) THEN
C
C THE ARRAY ISMFR CONTAINS THE WEAPON TYPES AT WHICH TO FIRE PREFERRED
C MUNITION ISM.
C
                  DO INSMFR = 1,NSMFR(ISM,II)
                    IW = ISMFR(INSMFR,ISM,II)
                    BAWASM(JW,IW,ISM) = AAWA(JW,IW,II) *
     &                                  BBFRASM(JW,IW,ISM)
                    BAWDSM(JW,IW,ISM) = AAWD(JW,IW,II) *
     &                                  BBFRDSM(JW,IW,ISM)
                  ENDDO ! TARGETS AT WHICH TO FIRE
                ENDIF   ! IF THERE ARE FIRERS AVAILABLE
              ENDDO     ! POSSIBLE FIRERS
            ENDIF       ! IF THERE ARE POSSIBLE FIRRERS AND TARGETS
          ENDDO         ! PREFERRED MUNITIONS
        ELSE
          DO ISM = 1,NSM(II)
C
```

```
C CHECK TO SEE IF THERE ARE POSSIBLE FIRERS AND TARGETS FOR
C PREFFERED MUNITION ISM
C
          IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
C
C THE ARRAY ISMW HOLDS THE WEAPONS TYPES WHICH MAY FIRE PREFERRED
C MUNITION ISM.
C
            DO INSMW = 1, NSMW(ISM,II)
              JW = ISMW(INSMW,ISM,II)
C
C CHECK TO SEE IF THERE ARE ANY OF THE FIRERS IN CONTACT
C
              IF (WSI(JW,IS,II) .GT. 0.) THEN
C
C THE ARRAY ISMFR CONTAINS THE WEAPON TYPES AT WHICH TO FIRE PREFERRED
C MUNITION ISM.
C
                DO INSMFR = 1,NSMFR(ISM,II)
                  IW = ISMFR(INSMFR,ISM,II)
                  RAWASM(JW,IW,ISM) = AAWA(JW,IW,II) *
     &                                RRFRASM(JW,IW,ISM)
                  RAWDSM(JW,IW,ISM) = AAWD(JW,IW,II) *
     &                                RRFRDSM(JW,IW,ISM)
                ENDDO ! TARGETS AT WHICH TO FIRE
              ENDIF   ! IF THERE ARE FIRERS AVAILABLE
            ENDDO     ! POSSIBLE FIRERS
          ENDIF       ! IF THERE ARE POSSIBLE FIRRERS AND TARGETS
        ENDDO         ! PREFERRED MUNITIONS
      ENDIF
C+-----------------------------------------------------------------------+
C+                                                                       +
C+ COMPUTE THE NUMBER OF ROUNDS OF PREFERRED MUNITION TYPE ISM WHICH SIDE II +
C+ WISHES TO FIRE BASED ON:                                              +
C+                                                                       +
C+        THE NUMBER OF WEAPON SYSTEMS FIRING MUNITION TYPE ISM          +
C+        THE ENGAGEMENT RATE OF THOSE SYSTEMS                           +
C+        AND THE ALLOCATION OF THOSE SYSTEMS WHEN FIRING MUNITION TYPE ISM +
C+                                                                       +
C+-----------------------------------------------------------------------+
C
C       DO ISM = 1,NSM(II)
C         BSHTRA(ISM) = 0.
C          BSHTRD(ISM) = 0.
C          RSHTRA(ISM) = 0.
C          RSHTRD(ISM) = 0.
C          BTRGT(ISM)  = 0.
C          RTRGT(ISM)  = 0.
C       ENDDO
C       IF (II .EQ. 1) THEN
C         DO ISM = 1,NSM(II)
C           IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
C             DO INSMW = 1, NSMW(ISM,II)
C               JW = ISMW(INSMW,ISM,II)
C               IF (WSI(JW,IS,II) .GT. 0.) THEN
C                 DO INSMFR = 1,NSMFR(ISM,II)
C                   IW = ISMFR(INSMFR,ISM,II)
```

```
C                   BSHTRA(ISM) = BSHTRA(ISM) + EERTA(JW,KPA,II) *
C     &                           BAWASM(JW,IW,ISM) * WSI(JW,IS,II)
C                   BSHTRD(ISM) = BSHTRD(ISM) + EERTD(JW,KPD,II) *
C     &                           BAWDSM(JW,IW,ISM) * WSI(JW,IS,II)
C                   BSTRAS(ISM) = BSHTRA(ISM)  ! STORE BLUE SHOOTERS ON ATTACK
C                   BSTRDS(ISM) = BSHTRD(ISM)  ! STORE BLUE SHOOTERS ON DEFENSE
C                 ENDDO ! TARGETS AT WHICH TO FIRE
C               ENDIF   ! IF THERE ARE FIRERS AVAILABLE
C             ENDDO     ! POSSIBLE FIRERS
C           ENDIF       ! IF THERE ARE POSSIBLE FIRRERS AND TARGETS
C         ENDDO         ! PREFERRED MUNITIONS
C       ELSE   ! II IS SIDE 2
C         DO ISM = 1,NSM(II)
C           IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
C             DO INSMW = 1, NSMW(ISM,II)
C               JW = ISMW(INSMW,ISM,II)
C               IF (WSI(JW,IS,II) .GT. 0.) THEN
C                 DO INSMFR = 1,NSMFR(ISM,II)
C                   IW = ISMFR(INSMFR,ISM,II)
C                   RSHTRA(ISM) = RSHTRA(ISM) + EERTA(JW,KPA,II) *
C     &                           RAWASM(JW,IW,ISM) * WSI(JW,IS,II)
C                   RSHTRD(ISM) = RSHTRD(ISM) + EERTD(JW,KPD,II) *
C     &                           RAWDSM(JW,IW,ISM) * WSI(JW,IS,II)
C                   RSTRAS(ISM) = RSHTRA(ISM)  ! STORE RED SHOOTERS ON ATTACK
C                   RSTRDS(ISM) = RSHTRD(ISM)  ! STORE RED SHOOTERS ON DEFENSE
C                 ENDDO ! TARGETS AT WHICH TO FIRE
C               ENDIF   ! IF THERE ARE FIRERS AVAILABLE
C             ENDDO     ! POSSIBLE FIRERS
C           ENDIF       ! IF THERE ARE POSSIBLE FIRRERS AND TARGETS
C         ENDDO         ! PREFERRED MUNITIONS
C       ENDIF
C+-------------------------------------------------------------------------+
C+                                                                         +
C+ COMPUTE THE NUMBER OF TARGETS AVAILABLE AT WHICH PREFERRED MUNITION ISM +
C+ WILL BE FIRED.                                                          +
C+                                                                         +
C+-------------------------------------------------------------------------+
C
C       IF (II .EQ. 1) THEN
C         DO ISM = 1,NSM(II)
C           IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
C             DO INSMW = 1, NSMW(ISM,II)
C               JW = ISMW(INSMW,ISM,II)
C               IF (WSI(JW,IS,II) .GT. 0.) THEN
C                 DO INSMFR = 1,NSMFR(ISM,II)
C                   IW = ISMFR(INSMFR,ISM,II)
C                   BTRGT(ISM) = BTRGT(ISM) + WSI(IW,IS,L)
C                 ENDDO ! TARGETS AT WHICH TO FIRE
C               ENDIF   ! IF THERE ARE FIRERS AVAILABLE
C             ENDDO     ! POSSIBLE FIRERS
C           ENDIF       ! IF THERE ARE POSSIBLE FIRRERS AND TARGETS
C         ENDDO         ! PREFERRED MUNITIONS
C       ELSE
C         DO ISM = 1,NSM(II)
C           IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
C             DO INSMW = 1, NSMW(ISM,II)
C               JW = ISMW(INSMW,ISM,II)
```

```
C                 IF (WSI(JW,IS,II) .GT. 0.) THEN
C                   DO INSMFR = 1,NSMFR(ISM,II)
C                     IW = ISMFR(INSMFR,ISM,II)
C                     RTRGT(ISM) = RTRGT(ISM) + WSI(IW,IS,L)
C                   ENDDO ! TARGETS AT WHICH TO FIRE
C                 ENDIF   ! IF THERE ARE FIRERS AVAILABLE
C               ENDDO     ! POSSIBLE FIRERS
C             ENDIF       ! IF THERE ARE POSSIBLE FIRRERS AND TARGETS
C           ENDDO         ! PREFERRED MUNITIONS
C         ENDIF
C+------------------------------------------------------------------------+
C+                                                                        +
C+ CHECK TO SEE IF THERE IS ENOUGH STOCK OF PREFERRED MUNITION ISM BASED  +
C+ THE NUMBER TO FIRE.                                                    +
C+                                                                        +
C+------------------------------------------------------------------------+
C         IF (II .EQ. 1) THEN
C           DO ISM = 1,NSM(II)
C             IF (BSHTRA(ISM) .GT. SMSTK(ISM,IS,II)) THEN
C               BSHTRA(ISM) = SMSTK(ISM,IS,II)
C             ENDIF
C             IF (BSHTRD(ISM) .GT. SMSTK(ISM,IS,II)) THEN
C               BSHTRD(ISM) = SMSTK(ISM,IS,II)
C             ENDIF
C           ENDDO
C         ELSE
C           DO ISM = 1,NSM(II)
C             IF (RSHTRA(ISM) .GT. SMSTK(ISM,IS,II)) THEN
C               RSHTRA(ISM) = SMSTK(ISM,IS,II)
C             ENDIF
C             IF (RSHTRD(ISM) .GT. SMSTK(ISM,IS,II)) THEN
C               RSHTRD(ISM) = SMSTK(ISM,IS,II)
C             ENDIF
C           ENDDO
C         ENDIF
C+------------------------------------------------------------------------+
C+                                                                        +
C+ MODIFY THE ALLOCATION OF PREFERRED MUNITION TO REFLECT LESS TARGETS THEN +
C+ THE AMOUNT OF PREFERRED MUNITION ISM TO BE FIRED.                      +
C+                                                                        +
C+------------------------------------------------------------------------+
C
C       IF (II .EQ. 1) THEN
C         DO ISM = 1,NSM(II)
C           IF (BSHTRA(ISM) .GT. BTRGT(ISM)) THEN
C             DO IW = 1,N3
C               DO JW = 1,N4
C                 BBFRASM(JW,IW,ISM) = BBFRASM(JW,IW,ISM) *
C     &                                BTRGT(ISM)/BSHTRA(ISM)
C               ENDDO
C             ENDDO
C           ELSE IF (BSHTRA(ISM) .LT. BSTRAS(ISM)) THEN
C             DO IW = 1,N3
C               DO JW = 1,N4
C                 BBFRASM(JW,IW,ISM) = BBFRASM(JW,IW,ISM) *
C     &                                BSHTRA(ISM)/BSTRAS(ISM)
C               ENDDO
```

```
C              ENDDO
C            ENDIF
C            IF (BSHTRD(ISM) .GT. BTRGT(ISM)) THEN
C              DO IW = 1,N3
C                DO JW = 1,N4
C                  BBFRDSM(JW,IW,ISM) = BBFRDSM(JW,IW,ISM) *
C     &                                 BTRGT(ISM)/BSHTRD(ISM)
C                ENDDO
C              ENDDO
C            ELSE IF (BSHTRD(ISM) .LT. BSTRDS(ISM)) THEN
C              DO IW = 1,N3
C                DO JW = 1,N4
C                  BBFRDSM(JW,IW,ISM) = BBFRDSM(JW,IW,ISM) *
C     &                                 BSHTRD(ISM)/BSTRDS(ISM)
C                ENDDO
C              ENDDO
C            ENDIF
C          ENDDO
C        ELSE
C          DO ISM = 1,NSM(II)
C            IF (RSHTRA(ISM) .GT. RTRGT(ISM)) THEN
C              DO IW = 1,N3
C                DO JW = 1,N4
C                  RRFRASM(JW,IW,ISM) = RRFRASM(JW,IW,ISM) *
C     &                                 RTRGT(ISM)/RSHTRA(ISM)
C                ENDDO
C              ENDDO
C            ELSE IF (RSHTRA(ISM) .LT. RSTRAS(ISM)) THEN
C              DO IW = 1,N3
C                DO JW = 1,N4
C                  RRFRASM(JW,IW,ISM) = RRFRASM(JW,IW,ISM) *
C     &                                 RSHTRA(ISM)/RSTRAS(ISM)
C                ENDDO
C              ENDDO
C            ENDIF
C            IF (RSHTRD(ISM) .GT. RTRGT(ISM)) THEN
C              DO IW = 1,N3
C                DO JW = 1,N4
C                  RRFRDSM(JW,IW,ISM) = RRFRDSM(JW,IW,ISM) *
C     &                                 RTRGT(ISM)/RSHTRD(ISM)
C                ENDDO
C              ENDDO
C            ELSE IF (RSHTRD(ISM) .LT. RSTRDS(ISM)) THEN
C              DO IW = 1,N3
C                DO JW = 1,N4
C                  RRFRDSM(JW,IW,ISM) = RRFRDSM(JW,IW,ISM) *
C     &                                 RSHTRD(ISM)/RSTRDS(ISM)
C                ENDDO
C              ENDDO
C            ENDIF
C          ENDDO
C        ENDIF
C+--------------------------------------------------------------------------+
C+                                                                          +
C+ RECOMPUTE THE ALLOCATION IF THE PREVIOUSLY COMPUTED ALLOCATION HAS BEEN  +
C+ MODIFIED BASED ON THE ABOVE CALCULATIONS.                                +
C+                                                                          +
```

```
C+-----------------------------------------------------------------------+
C
C        IF (II .EQ. 1) THEN
C          DO ISM = 1,NSM(II)
C            IF (BSHTRA(ISM) .GT  0. .OR. BSHTRD(ISM) .GT. 0.) THEN
C              IF (BSHTRA(ISM) .GT. BTRGT(ISM) .OR.
C     &            BSHTRD(ISM) .GT. BTRGT(ISM) .OR.
C     &            BSHTRA(ISM) .LT. BSTRAS(ISM) .OR.
C     &            BSHTRD(ISM) .LT. BSTRDS(ISM)) THEN
C                IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
C                  DO INSMW = 1, NSMW(ISM,II)
C                    JW = ISMW(INSMW,ISM,II)
C                    IF (WSI(JW,IS,II) .GT. 0.) THEN
C                      DO INSMFR = 1,NSMFR(ISM,II)
C                        IW = ISMFR(INSMFR,ISM,II)
C                        BAWASM(JW,IW,ISM) = AAWA(JW,IW,II) *
C     &                                      BBFRASM(JW,IW,ISM)
C                        BAWDSM(JW,IW,ISM) = AAWD(JW,IW,II) *
C     &                                      BBFRDSM(JW,IW,ISM)
C                      ENDDO ! TARGETS AT WHICH TO FIRE
C                    ENDIF   ! IF THERE ARE FIRERS AVAILABLE
C                  ENDDO     ! POSSIBLE FIRERS
C                ENDIF       ! IF THERE ARE POSSIBLE FIRERS AND TARGETS
C              ENDIF         ! IF THERE WAS AN ADJUSTMENT TO THE ALLOCATION
C            ENDIF
C          ENDDO             ! PREFERRED MUNITIONS
C        ELSE
C          DO ISM = 1,NSM(II)
C            IF (RSHTRA(ISM) .GT. 0. .OR. RSHTRD(ISM) .GT. 0.) THEN
C              IF (RSHTRA(ISM) .GT. RTRGT(ISM) .OR.
C     &            RSHTRD(ISM) .GT. RTRGT(ISM) .OR.
C     &            RSHTRA(ISM) .LT. RSTRAS(ISM) .OR.
C     &            RSHTRD(ISM) .LT. RSTRDS(ISM)) THEN
C                IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
C                  DO INSMW = 1, NSMW(ISM,II)
C                    JW = ISMW(INSMW,ISM,II)
C                    IF (WSI(JW,IS,II) .GT. 0.) THEN
C                      DO INSMFR = 1,NSMFR(ISM,II)
C                        IW = ISMFR(INSMFR,ISM,II)
C                        RAWASM(JW,IW,ISM) = AAWA(JW,IW,II) *
C     &                                      RRFRASM(JW,IW,ISM)
C                        RAWDSM(JW,IW,ISM) = AAWD(JW,IW,II) *
C     &                                      RRFRDSM(JW,IW,ISM)
C                      ENDDO ! TARGETS AT WHICH TO FIRE
C                    ENDIF   ! IF THERE ARE FIRERS AVAILABLE
C                  ENDDO     ! POSSIBLE FIRERS
C                ENDIF       ! IF THERE ARE POSSIBLE FIRERS AND TARGETS
C              ENDIF         ! IF THERE WAS AN ADJUSTMENT TO THE ALLOCATION
C            ENDIF
C          ENDDO             ! PREFERRED MUNITIONS
C        ENDIF
         IF (II .EQ. 1) THEN
           DO IW = 1,N3
             DO JW = 1,N4
               BSUMA(JW,IW,II) = 0.0
               BSUMD(JW,IW,II) = 0.0
             ENDDO
```

```
            ENDDO
            DO IW = 1,N3
              DO JW = 1,N4
                DO ISM = 1,NSM(II)
                  BSUMA(JW,IW,II) = BSUMA(JW,IW,II) + BAWASM(JW,IW,ISM)
                  BSUMD(JW,IW,II) = BSUMD(JW,IW,II) + BAWDSM(JW,IW,ISM)
                ENDDO
                AAWA(JW,IW,II) = AAWA(JW,IW,II) - BSUMA(JW,IW,II)
                AAWD(JW,IW,II) = AAWD(JW,IW,II) - BSUMD(JW,IW,II)
              ENDDO
            ENDDO
          ELSE
            DO IW = 1,N3
              DO JW = 1,N4
                RSUMA(JW,IW,II) = 0.0
                RSUMD(JW,IW,II) = 0.0
              ENDDO
            ENDDO
            DO IW = 1,N3
              DO JW = 1,N4
                DO ISM = 1,NSM(II)
                  RSUMA(JW,IW,II) = RSUMA(JW,IW,II) + RAWASM(JW,IW,ISM)
                  RSUMD(JW,IW,II) = RSUMD(JW,IW,II) + RAWDSM(JW,IW,ISM)
                ENDDO
                AAWA(JW,IW,II) = AAWA(JW,IW,II) - RSUMA(JW,IW,II)
                AAWD(JW,IW,II) = AAWD(JW,IW,II) - RSUMD(JW,IW,II)
              ENDDO
            ENDDO
          ENDIF
C ---------------------------------------------------------------------
C  POSTURE DEPENDENT ENGAGEMENT RATE AND KILL PROBABILITIES
C ---------------------------------------------------------------------
          IF (II .EQ. 1) THEN
            DO ISM = 1,NSM(II)
              IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
                DO INSMW = 1, NSMW(ISM,II)
                  JW = ISMW(INSMW,ISM,II)
                  IF (WSI(JW,IS,II) .GT. 0.) THEN
                    DO INSMFR = 1,NSMFR(ISM,II)
                      IW = ISMFR(INSMFR,ISM,II)
                      BVWASM(JW,IW,ISM) = EERTA(JW,KPA,II) *
     $                                    BPKASM(JW,IW,ISM) *
     $                                    FPKASM(KPA)
                      BVWDSM(JW,IW,ISM) = EERTD(JW,KPD,II) *
     $                                    BPKDSM(JW,IW,ISM) *
     $                                    FPKDSM(KPD)
                    ENDDO ! TARGETS AT WHICH TO FIRE
                  ENDIF   ! IF THERE ARE FIRERS AVAILABLE
                ENDDO     ! POSSIBLE FIRERS
              ENDIF       ! IF THERE ARE POSSIBLE FIRERS AND TARGETS
            ENDDO         ! PREFERRED MUNITIONS
          ELSE
            DO ISM = 1,NSM(II)
              IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
                DO INSMW = 1, NSMW(ISM,II)
                  JW = ISMW(INSMW,ISM,II)
                  IF (WSI(JW,IS,II) .GT. 0.) THEN
```

```
                    DO INSMFR = 1,NSMFR(ISM,II)
                      IW = ISMFR(INSMFR,ISM,II)
                      RVWASM(JW,IW,ISM) = EERTA(JW,KPA,II) *
     &                                    RPKASM(JW,IW,ISM) *
     &                                    FPKASM(KPA)
                      RVWDSM(JW,IW,ISM) = EERTD(JW,KPD,II) *
     &                                    RPKDSM(JW,IW,ISM) *
     &                                    FPKDSM(KPD)
                    ENDDO ! TARGETS AT WHICH TO FIRE
                  ENDIF   ! IF THERE ARE FIRERS AVAILABLE
                ENDDO     ! POSSIBLE FIRERS
              ENDIF       ! IF THERE ARE POSSIBLE FIRERS AND TARGETS
            ENDDO         ! PREFERRED MUNITIONS
          ENDIF
C -----------------------------------------------------------------------
C KILL PROBABILITIES FOR NON-PREFERRED MUNITIONS FOR POSTURE
C AND VALUE OF WEAPONS ON ATTACK AND DEFENSE
C -----------------------------------------------------------------------
          IF (II .EQ. 1) THEN
            DO IW = 1,N3
              DO JW = 1,N4
                VIWAW(JW,IW,II) = EERTA(JW,KPA,II) * BPKAW(JW,IW,KPA)
                VIWDW(JW,IW,II) = EERTD(JW,KPD,II) * BPKDW(JW,IW,KPD)
              ENDDO
            ENDDO
          ELSE
            DO IW = 1,N3
              DO JW = 1,N4
                VIWAW(JW,IW,II) = EERTA(JW,KPA,II) * RPKAW(JW,IW,KPA)
                VIWDW(JW,IW,II) = EERTD(JW,KPD,II) * RPKDW(JW,IW,KPD)
              ENDDO
            ENDDO
          ENDIF
C -----------------------------------------------------------------------
C KILL RATE MATRICES FOR USE BY PREFERRED AND NON-PREFERRED MUNITIONS
C -----------------------------------------------------------------------
          IF (II .EQ. 1) THEN
            DO ISM = 1,NSM(II)
              DO IW = 1,N3
                DO JW = 1,N4
                  PWAKSM(JW,IW,ISM,II) = BVWASM(JW,IW,ISM) *
     &                                   BAWASM(JW,IW,ISM)
                  PWDKSM(JW,IW,ISM,II) = BVWDSM(JW,IW,ISM) *
     &                                   BAWDSM(JW,IW,ISM)
                ENDDO
              ENDDO
            ENDDO
          ELSE
            DO ISM = 1,NSM(II)
              DO IW = 1,N3
                DO JW = 1,N4
                  PWAKSM(JW,IW,ISM,II) = RVWASM(JW,IW,ISM) *
     &                                   RAWASM(JW,IW,ISM)
                  PWDKSM(JW,IW,ISM,II) = RVWDSM(JW,IW,ISM) *
     &                                   RAWDSM(JW,IW,ISM)
                ENDDO
              ENDDO
```

```
            ENDDO
          ENDIF
C
C  COMPUTE THE KILL POTENTIALS FOR JW TYPE WEAPONS OF SIDE II AGAINST
C  IW TYPE WEAPONS FOR SIDE L, WHEN SIDE II IS ON THE ATTACK AND ON THE
C  DEFENSE
C
          DO IW = 1,N3
            DO JW = 1,N4
              PWAKW(JW,IW,II) = VIWAW(JW,IW,II) * AAWA(JW,IW,II)
              PWDKW(JW,IW,II) = VIWDW(JW,IW,II) * AAWD(JW,IW,II)
            ENDDO
          ENDDO
          DO IW = 1,N3
            DO JW = 1,N4
              PWSUMA(JW,IW,II) = 0.
              PWSUMD(JW,IW,II) = 0.
              DO ISM = 1,NSM(II)
                PWSUMA(JW,IW,II) = PWSUMA(JW,IW,II) +
     &                             PWAKSM(JW,IW,ISM,II)
                PWSUMD(JW,IW,II) = PWSUMD(JW,IW,II) +
     &                             PWDKSM(JW,IW,ISM,II)
              ENDDO
            ENDDO
          ENDDO
C ---------------------------------------------------------------------
C  COMPOSITE KILL RATE MATRICES FOR USE OF NON-PREFERRED
C  AND PREFERRED MUNITIONS
C ---------------------------------------------------------------------
          DO IW = 1,N3
            DO JW = 1,N4
              PWAKW(JW,IW,II) = PWAKW(JW,IW,II) + PWSUMA(JW,IW,II)
              PWDKW(JW,IW,II) = PWDKW(JW,IW,II) + PWSUMD(JW,IW,II)
            ENDDO
          ENDDO
C ---------------------------------------------------------------------
C  PRINT IN FILE TABLOUT.DAT TEMPORARILY FOR DEBUGGING
C ---------------------------------------------------------------------
          IF (KPSMGA(15) .EQ. 1) THEN
            WRITE (MOT,644) IS,(APT(KPS(IS),IWRD),IWRD=1,2)
 644        FORMAT ('1',' SECTOR', I4,' POSTURE ',2A4)
            NN = NW(L)
            IENDW = 0
            LINCNT = 0
            DO WHILE (NN .GT. 0)
              ISTW = IENDW + 1
              IF (NN .GT. 12) THEN
                IENDW = IENDW + 12
              ELSE
                IENDW = IENDW + NN
              ENDIF
              NUMWPS = (IENDW - ISTW) + 1
              WRITE (MOT,600) II,L,ICYCLE,
     &                 ((AWT(IW,IWRD,L),IWRD=1,2),IW=ISTW,IENDW)
 600          FORMAT (/,' ADJUSTED ALLOCATION (ATTACK) -- SIDE',I3,
     &              ' AGAINST SIDE',I3,' CYCLE',I4/9X,12(1X,2A4)/)
              DO JW = 1,N4
```

```
                    WRITE (MOT,602)(AWT(JW,IWRD,II),IWRD=1,2),
         &                          (AAWA(JW,IW,II),IW=ISTW,IENDW)
 602                FORMAT (1X,2A4,12(1X,F8.3))
                    LINCNT = LINCNT + 1
                  ENDDO
                  NN = NN - NUMWPS
                ENDDO
                NN = NW(L)
                IENDW = 0
                XNLIN = (N3 / 12.) + .5
                NUMLIN = LINCNT + XNLIN
                IF (NUMLIN .GT. 45) THEN
                  WRITE (MOT,644) IS,(APT(KPS(IS),IWRD),IWRD=1,2)
                  LINCNT = 0
                ENDIF
                DO WHILE (NN .GT. 0)
                  ISTW = IENDW + 1
                  IF (NN .GT. 12) THEN
                    IENDW = IENDW + 12
                  ELSE
                    IENDW = IENDW + NN
                  ENDIF
                  NUMWPS = (IENDW - ISTW) + 1
                  WRITE (MOT,603) II,L,ICYCLE,
         &                          ((AWT(IW,IWRD,L),IWRD=1,2),IW=ISTW,IENDW)
 603              FORMAT (/,' ADJUSTED ALLOCATION (DEFENSE) — SIDE',I3,
         &                ' AGAINST SIDE',I3,' CYCLE',I4/9X,12(1X,2A4)/)
                  DO JW = 1,N4
                    WRITE (MOT,602)(AWT(JW,IWRD,II),IWRD=1,2),
         &                          (AAWD(JW,IW,II),IW=ISTW,IENDW)
                    LINCNT = LINCNT + 1
                  ENDDO
                  NN = NN - NUMWPS
                ENDDO
                IF (II .EQ. 1) THEN
                  DO ISM = 1,NSM(II)
                    WRITE (MOT,606) ISM,ICYCLE
 606                FORMAT (/,' ADJUSTED ALLOCATION OF BLUE (ATTACK)',
         &                  ' FOR PREFERRED MUNITION TYPE',I3,' CYCLE',I4)
                    DO INSMW = 1,NSMW(ISM,II)
                      JW = ISMW(INSMW,ISM,II)
 607                  WRITE (MOT,6002)(AWT(JW,IWORD,II),IWORD=1,2),
         &                            (BAWASM(JW,IW,ISM),IW=1,N3)
                    ENDDO
 6002               FORMAT(1X,2A4,1X,12F8.3)
                    WRITE (MOT,609) ISM,ICYCLE
 609                FORMAT (/,' ADJUSTED ALLOCATION OF BLUE (DEFENSE)',
         &                  ' FOR PREFERRED MUNITION TYPE',I3,' CYCLE',I4)
                    DO INSMW = 1,NSMW(ISM,II)
                      JW = ISMW(INSMW,ISM,II)
                      WRITE (MOT,6002)(AWT(JW,IWORD,II),IWORD=1,2),
         &                            (BAWDSM(JW,IW,ISM),IW=1,N3)
                    ENDDO
                    WRITE (MOT,618) ISM,ICYCLE
 618                FORMAT (/,' BLUE SINGLE WEAPON VALUE (ATTACK) FOR ',
         &                 'PREFERRED MUNITION TYPE',I3,' CYCLE',I4)
                    DO INSMW = 1,NSMW(ISM,II)
```

```
                   JW = ISMW(INSMW,ISM,II)
                   WRITE (MOT,6002)(AWT(JW,IWORD,II),IWORD=1,2),
     &                          (BVWASM(JW,IW,ISM),IW = 1,N3)
                 ENDDO
                 WRITE (MOT,621) ISM,ICYCLE
 621             FORMAT (/,' BLUE SINGLE WEAPON VALUE (DEFENSE)FOR ',
     &                 'PREFERRED MUNITION TYPE',I3,' CYCLE',I4)
                 DO INSMW = 1,NSMW(ISM,II)
                   JW = ISMW(INSMW,ISM,II)
                   WRITE (MOT,6002)(AWT(JW,IWORD,II),IWORD=1,2),
     &                          (BVWDSM(JW,IW,ISM),IW = 1,N3)
                 ENDDO
               ENDDO
               NN = NW(L)
               IENDW = 0
               LINCNT = 0
               WRITE(MOT,623)
 623           FORMAT('1')
               DO WHILE (NN .GT. 0)
                 ISTW = IENDW + 1
                 IF (NN .GT. 12) THEN
                   IENDW = IENDW + 12
                 ELSE
                   IENDW = IENDW + NN
                 ENDIF
                 NUMWPS = (IENDW - ISTW) + 1
                 WRITE (MOT,624) ICYCLE,
     &                        ((AWT(IW,IWRD,L),IWRD=1,2),IW=ISTW,IENDW)
 624             FORMAT (/' KILL RATE MATRIX FOR BLUE ON ATTACK CYCLE',
     &                I4/9X,12(1X,2A4))
                 DO JW = 1,N4
                   WRITE (MOT,602)(AWT(JW,IWRD,II),IWRD=1,2),
     &                          (PWAKW(JW,IW,II),IW=ISTW,IENDW)
                   LINCNT = LINCNT + 1
                 ENDDO
                 NN = NN - NUMWPS
               ENDDO
               NN = NW(L)
               IENDW = 0
               XNLIN = (NN / 12.) + .5
               NUMLIN = LINCNT + XNLIN
               IF (NUMLIN .GT. 45) THEN
                 WRITE (MOT,623)
                 LINCNT = 0
               ENDIF
               DO WHILE (NN .GT. 0)
                 ISTW = IENDW + 1
                 IF (NN .GT. 12) THEN
                   IENDW = IENDW + 12
                 ELSE
                   IENDW = IENDW + NN
                 ENDIF
                 NUMWPS = (IENDW - ISTW) + 1
                 WRITE (MOT,627) ICYCLE,
     &                        ((AWT(IW,IWRD,L),IWRD=1,2),IW=ISTW,IENDW)
 627             FORMAT (/' KILL RATE MATRIX FOR BLUE ON DEFENSE CYCLE',
     &                I4/9X,12(1X,2A4))
```

```
                DO JW = 1,N4
                  WRITE (MOT,602)(AWT(JW,IWRD,II),IWRD=1,2),
     &                           (PWDKW(JW,IW,II),IW=ISTW,IENDW)
                  LINCNT = LINCNT + 1
                ENDDO
                NN = NN - NUMWPS
              ENDDO
            ELSE
              DO ISM = 1,NSM(II)
                WRITE (MOT,612) ISM,ICYCLE
 612            FORMAT (/,' ADJUSTED ALLOCATION OF RED (ATTACK)',
     &                  ' FOR PREFERRED MUNITION TYPE',I3,' CYCLE',I4)
                DO INSMW = 1,NSMW(ISM,II)
                  JW = ISMW(INSMW,ISM,II)
                  WRITE (MOT,6002)(AWT(JW,IWORD,II),IWORD=1,2),
     &                            (RAWASM(JW,IW,ISM),IW = 1,N3)
                ENDDO
                WRITE (MOT,615) ISM,ICYCLE
 615            FORMAT (/,' ADJUSTED ALLOCATION OF RED (DEFENSE)',
     &                  ' FOR PREFERRED MUNITION TYPE',I3,' CYCLE',I4)
                DO INSMW = 1,NSMW(ISM,II)
                  JW = ISMW(INSMW,ISM,II)
                  WRITE (MOT,6002)(AWT(JW,IWORD,II),IWORD=1,2),
     &                            (RAWDSM(JW,IW,ISM),IW = 1,N3)
                ENDDO
              ENDDO
              NN = NW(L)
              IENDW = 0
              LINCNT = 0
              WRITE(MOT,623)
              DO WHILE (NN .GT. 0)
                ISTW = IENDW + 1
                IF (NN .GT. 12) THEN
                  IENDW = IENDW + 12
                ELSE
                  IENDW = IENDW + NN
                ENDIF
                NUMWPS = (IENDW - ISTW) + 1
                WRITE (MOT,638) ICYCLE,
     &                           ((AWT(IW,IWRD,L),IWRD=1,2),IW=ISTW,IENDW)
 638            FORMAT (/' KILL RATE MATRIX FOR RED ON ATTACK CYCLE',
     &                 I4/9X,12(1X,2A4))
                DO JW = 1,N4
                  WRITE (MOT,602)(AWT(JW,IWRD,II),IWRD=1,2),
     &                           (PWAKW(JW,IW,II),IW=ISTW,IENDW)
                  LINCNT = LINCNT + 1
                ENDDO
                NN = NN - NUMWPS
              ENDDO
              NN = NW(L)
              IENDW = 0
              XNLIN = (NN / 12.) + .5
              NUMLIN = LINCNT + XNLIN
              IF (NUMLIN .GT. 45) THEN
                WRITE (MOT,623)
                LINCNT = 0
              ENDIF
```

```
            DO WHILE (NN .GT. 0)
              ISTW = IENDW + 1
              IF (NN .GT. 12) THEN
                IENDW = IENDW + 12
              ELSE
                IENDW = IENDW + NN
              ENDIF
              NUMWPS = (IENDW - ISTW) + 1
              WRITE (MOT,641) ICYCLE,
     &                     ((AWT(IW,IWRD,L),IWRD=1,2),IW=ISTW,IENDW)
 641          FORMAT (/' KILL RATE MATRIX FOR RED ON DEFENSE CYCLE',
     &               I4/9X,12(1X,2A4))
              DO JW = 1,N4
                WRITE (MOT,602)(AWT(JW,IWRD,II),IWRD=1,2),
     &                     (PWDKW(JW,IW,II),IW=ISTW,IENDW)
                LINCNT = LINCNT + 1
              ENDDO
              NN = NN - NUMWPS
            ENDDO
          ENDIF
        ENDIF
C ------------------------------------------------------------------------
C  INVENTORY OF PREFERRED AND NON-PREFERRED MUNITIONS
C ------------------------------------------------------------------------
      DO ISM = 1,NSM(II)
        DO JW = 1,N4
          SMENG(JW,ISM,IS,II) = 0.
        ENDDO
      ENDDO
      DO JW = 1,N4
        TEXNPM(JW,IS,II) = 0.
      ENDDO
      ISATT = ISAT(ISA(IS),IS)  ! FIND THE SECTOR ATTACKER W/FUNC ISAT
      IF (ISATT .EQ. II) THEN
C
C COMPUTE THE EXPENDITURE OF NON-PREFERRED MUNITIONS
C
        DO IW = 1,N3
          DO JW = 1,N4
            EXNPMN(JW,IW,II) = EERTA(JW,KPA,II) * AAWA(JW,IW,II)
            TEXNPM(JW,IS,II) = TEXNPM(JW,IS,II) + EXNPMN(JW,IW,II)
          ENDDO
        ENDDO
C
C COMPUTE THE EXPENDITURE OF PRFERRED MUNITIONS.
C
        IF (II .EQ. 1) THEN
          DO ISM = 1,NSM(II)
            IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
              DO INSMW = 1, NSMW(ISM,II)
                JW = ISMW(INSMW,ISM,II)
                IF (WSI(JW,IS,II) .GT. 0.) THEN
                  DO INSMFR = 1,NSMFR(ISM,II)
                    IW = ISMFR(INSMFR,ISM,II)
                    EXPMN(JW,IW,ISM,IS,II) = EERTA(JW,KPA,II) *
     &                                       BAWASM(JW,IW,ISM)
                    SMENG(JW,ISM,IS,II) = SMENG(JW,ISM,IS,II) +
```

```
     &                                EXPMN(JW,IW,ISM,IS,II)
                ENDDO ! TARGETS AT WHICH TO FIRE
              ENDIF   ! IF THERE ARE FIRERS AVAILABLE
            ENDDO     ! POSSIBLE FIRERS
          ENDIF       ! IF THERE ARE POSSIBLE FIRERS AND TARGETS
        ENDDO         ! PREFERRED MUNITIONS
      ELSE
        DO ISM = 1,NSM(II)
          IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
            DO INSMW = 1, NSMW(ISM,II)
              JW = ISMW(INSMW,ISM,II)
              IF (WSI(JW,IS,II) .GT. 0.) THEN
                DO INSMFR = 1,NSMFR(ISM,II)
                  IW = ISMFR(INSMFR,ISM,II)
                  EXPMN(JW,IW,ISM,IS,II) = EERTA(JW,KPA,II) *
     &                                RAWASM(JW,IW,ISM)
                  SMENG(JW,ISM,IS,II) = SMENG(JW,ISM,IS,II) +
     &                                EXPMN(JW,IW,ISM,IS,II)
                ENDDO ! TARGETS AT WHICH TO FIRE
              ENDIF   ! IF THERE ARE FIRERS AVAILABLE
            ENDDO     ! POSSIBLE FIRERS
          ENDIF       ! IF THERE ARE POSSIBLE FIRERS AND TARGETS
        ENDDO           ! PREFERRED MUNITIONS
      ENDIF
    ELSE
C
C SIDE II IS THE DEFENDER
C
      DO IW = 1,N3
        DO JW = 1,N4
          EXNPMN(JW,IW,II) = EERTD(JW,KPD,II) * AAWD(JW,IW,II)
          TEXNPM(JW,IS,II) = TEXNPM(JW,IS,II) + EXNPMN(JW,IW,II)
        ENDDO
      ENDDO
      IF (II .EQ. 1) THEN
        DO ISM = 1,NSM(II)
          IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
            DO INSMW = 1, NSMW(ISM,II)
              JW = ISMW(INSMW,ISM,II)
              IF (WSI(JW,IS,II) .GT. 0.) THEN
                DO INSMFR = 1,NSMFR(ISM,II)
                  IW = ISMFR(INSMFR,ISM,II)
                  EXPMN(JW,IW,ISM,IS,II) = EERTD(JW,KPD,II) *
     &                                BAWDSM(JW,IW,ISM)
                  SMENG(JW,ISM,IS,II) = SMENG(JW,ISM,IS,II) +
     &                                EXPMN(JW,IW,ISM,IS,II)
                ENDDO ! TARGETS AT WHICH TO FIRE
              ENDIF   ! IF THERE ARE FIRERS AVAILABLE
            ENDDO     ! POSSIBLE FIRERS
          ENDIF       ! IF THERE ARE POSSIBLE FIRERS AND TARGETS
        ENDDO           ! PREFERRED MUNITIONS
      ELSE
        DO ISM = 1,NSM(II)
          IF (NSMW(ISM,II) .GT. 0 .AND. NSMFR(ISM,II) .GT. 0) THEN
            DO INSMW = 1, NSMW(ISM,II)
              JW = ISMW(INSMW,ISM,II)
              IF (WSI(JW,IS,II) .GT. 0.) THEN
```

```
                    DO INSMFR = 1,NSMFR(ISM,II)
                      IW = ISMFR(INSMFR,ISM,II)
                      EXPMN(JW,IW,ISM,IS,II) = EERTD(JW,KPD,II) *
     &                                    RAWDSM(JW,IW,ISM)
                      SMENG(JW,ISM,IS,II) = SMENG(JW,ISM,IS,II) +
     &                                   EXPMN(JW,IW,ISM,IS,II)
                    ENDDO ! TARGETS AT WHICH TO FIRE
                  ENDIF   ! IF THERE ARE FIRERS AVAILABLE
                ENDDO     ! POSSIBLE FIRERS
              ENDIF       ! IF THERE ARE POSSIBLE FIRERS AND TARGETS
            ENDDO           ! PREFERRED MUNITIONS
          ENDIF
        ENDIF
C
C  ADJUST ARTILLERY'S KILL POTENTIAL DUE TO TERRAIN ON ATTACK AND DEFENSE
C  ARTILLERY IS WEAPON CLASS 2
C
          DO IW = 1,N3
            DO JWIC = 1,NWTIWC(2,II)
              JW  = IWTIWC(JWIC,2,II)
              PWAKW(JW,IW,II) = PWAKW(JW,IW,II) * FRRINA(1,KTI)
              PWDKW(JW,IW,II) = PWDKW(JW,IW,II) * FRRINA(KPD,KTI)
            ENDDO
          ENDDO
C
C  ADJUST HELO'S KILL POTENTIAL DUE TO TERRAIN ON ATTACK AND ON DEFENSE
C  HELO'S IS WEAPON CLASS 3
C
          DO IW = 1,N3
            DO JWIC = 1,NWTIWC(3,II)
              JW  = IWTIWC(JWIC,3,II)
              PWAKW(JW,IW,II) = PWAKW(JW,IW,II) * FRRINH(1,KTI)
              PWDKW(JW,IW,II) = PWDKW(JW,IW,II) * FRRINH(KPD,KTI)
            ENDDO
          ENDDO
 1050 CONTINUE
C
C  CHECK TO SEE IF BLUE STILL HAS SOME OF THE BLUE RFERENCE WEAPONS,
C  AND THAT THE BLUE REFERENCE WEAPON HAS TARGETS.
C
C  IF BLUE HAS NONE OF ITS REFERNCE WEAPON THEN
C    IF (BLUE IS THE DEFENDER) THEN
C      RED CONTINUES ATTACK
C      WITH FRAD = 999.
C    ELSE
C      BLUE GOES TO A HOLDING POSTURE
C    ENDIF
C  ENDIF
C
C FIND THE SECTOR ATTACKER
C
        IF (MVCASO .NE. 3) THEN
C
C  CHECK TO SEE IF BLUE HAS ANY OF THE REFERENCE WEAPON
C
          IFLG = 0
          ICNT = 1
```

```
          DO WHILE (IFLG .EQ. 0 .AND. IWUCE(ICNT) .GT. 0)
            IWUCEE = IWUCE(ICNT)
            IF (WSI(IWUCEE,IS,1) .EQ. 0.) THEN    ! BLUE HAS NONE OF THE REF WEAPON
C
C  THERE ARE NONE OF THE PRIMARY REFERENCE WEAPON PRESENT, CHECK TO SEE
C  IF ANOTHER WEAPON OF THE SAME GENERIC TYPE IS PRESENT.
C
              IGWT = LNKWPT(IWUCEE,1)
              IF (NWTIGT(IGWT,1) .GT. 0) THEN
                NUMWEP = 1
                DO WHILE (IWUCEE .EQ. IWUCE(ICNT) .AND.
     &                    NUMWEP .LE. NWTIGT(IGWT,1))
                  IWEP = IWTIGT(NUMWEP,IGWT,1)
                  IF (WSI(IWEP,IS,1) .GT. 0.) THEN
                    IWUCEE = IWEP
                    IFLG = 1
                  ENDIF
                  NUMWEP = NUMWEP + 1
                ENDDO
              ENDIF
            ELSE
              IFLG = 1
            ENDIF
            ICNT = ICNT + 1
            IF (IWUCE(ICNT) .GT. NW(1))IFLG = 1
          ENDDO
          IWUCES(IS) = IWUCEE
          IF (WSI(IWUCEE,IS,1) .EQ. 0.) THEN
            IWUCES(IS) = 0
            WRITE(MOT,1012) IS, ICYCLE
 1012       FORMAT('1',10(/), ' SECTOR: ',I3,'       CYCLE:',I3,5(/),
     &             20X,'BLUE HAS NONE OF ITS REFERENCE WEAPONS')
            IF (ISATT .EQ. 1) THEN           ! BLUE IS THE SECTOR ATTACKER
              ISA(IS) = 0                    ! GO INTO HOLDING
              FRAD(IS)=0.
              KPS(IS)=6
              WRITE(MOT,1013)
 1013         FORMAT(/20X,'BLUE WAS ATTACKING AND WILL GO INTO ',
     &                    'HOLDING.')
            ELSE                             ! RED IS SECTOR ATTACKER
              IF (ISCEF(IS) .EQ. 0) THEN
                ISA(IS)=2
              ELSE
                ISA(IS) = -2
              ENDIF
              FRAD(IS)=999.
              WRITE(MOT,1014)
 1014         FORMAT(/20X,'RED WAS ATTACKING AND WILL CONTINUE THE ',
     &                    'ATTACK WITH A FRAD = 999.')
            ENDIF
            GOTO 9999
          ENDIF
        ENDIF
        IF (ICSA(IS) .EQ. 0) ISA(IS) = 0
C
C  -----------------------------------------------------------------
C 15) COMPUTE PERCENT RED AIR KILLS BLUE, PERCENT BLUE AIR KILLS RED.
```

```
C   ------------------------------------------------------------------
        DO 1550 L = 1,2
          II = 3 - L
          N3 = NW(L)
          N4 = NAM(II)
          N6 = NMM(II)
          IF (MVCASO .EQ. 3) THEN
            DO IW = 1,N3
              DO IAM = 1,N4
                AAMA(IAM,IW,II) = SSAMA(IAM,IW,II)
                AAMD(IAM,IW,II) = SSAMD(IAM,IW,II)
              ENDDO
            ENDDO
            DO IW = 1,N3
              DO IMM = 1,N6
                AAMMA(IMM,IW,II) = SSAMMA(IMM,IW,II)
                AAMMD(IMM,IW,II) = SSAMMD(IMM,IW,II)
              ENDDO
            ENDDO
          ELSE
C
C  WHEN COMPUTING THE AIR-TO-GROUND KILLS, THE NUMBER OF WEAPONS IN THE
C  SECTOR (WS) IS USED INSTEAD OF THE ADJUSTED NUMBER. THIS IS BECAUSE
C  ALL OF THE WEAPONS IN THE SECTOR ARE SUBJECT TO AIR ATTACK.
C
            DO 1530 IAM = 1,N4
              SUMA = 0.
              SUMD = 0.
              DO 1510 IW = 1,N3
                AAMA(IAM,IW,II) = 0.
                AAMD(IAM,IW,II) = 0.
                SUMA = SUMA + (SSAMA(IAM,IW,II) * WS(IW,L))
                SUMD = SUMD + (SSAMD(IAM,IW,II) * WS(IW,L))
 1510         CONTINUE
              IF (SUMA .GT. 0.) THEN
                DO 1511 IW = 1,N3
                  AAMA(IAM,IW,II) = (SSAMA(IAM,IW,II) * WS(IW,L)) / SUMA
 1511           CONTINUE
              ENDIF
              IF (SUMD .GT. 0.) THEN
                DO 1512 IW = 1,N3
                  AAMD(IAM,IW,II) = (SSAMD(IAM,IW,II) * WS(IW,L)) / SUMD
 1512           CONTINUE
              ENDIF
 1530       CONTINUE
            DO 1569 IMM = 1,N6
              SUMA = 0.
              SUMD = 0.
              DO 1562 IW = 1,N3            !SIDE L'S WEAPONS
                AAMMA(IMM,IW,II) = 0.
                AAMMD(IMM,IW,II) = 0.
                SUMA = SUMA + SSAMMA(IMM,IW,II) * WS(IW,L)
                SUMD = SUMD + SSAMMD(IMM,IW,II) * WS(IW,L)
 1562         CONTINUE
              IF (SUMA. GT. 0) THEN
                DO 1564 IW = 1,N3
                  AAMMA(IMM,IW,II) = (SSAMMA(IMM,IW,II) * WS(IW,L)) / SUMA
```

```
 1564         CONTINUE
            ENDIF
            IF (SUMD .GT. 0) THEN
              DO 1568 IW = 1,N3
                AAMMD(IMM,IW,II) = (SSAMMD(IMM,IW,II) * WS(IW,L)) / SUMD
 1568         CONTINUE
            ENDIF
 1569     CONTINUE
        ENDIF
        N5 = NAC(II)
        IMT = 2 + 6 * (II - 1)
        DO 1540 IW = 1,N3
          DO 1535 IAC = 1,N5
            PAAKW(IAC,IW,II) = 0.
            PADKW(IAC,IW,II) = 0.
            ALOAD = AMLFD(IAC,IS,II) * AMNLAF(IAC,1,II)
            DO 1534 IAM = 1,N4
              PAAKW(IAC,IW,II) = PAAKW(IAC,IW,II) + (ALOAD *
     &                           AMNL(IAC,IAM,IMT) * AAMA(IAM,IW,II)*
     &                           VAMAW(IAM,IW,II))
              PADKW(IAC,IW,II) = PADKW(IAC,IW,II) + (ALOAD *
     &                           AMNL(IAC,IAM,IMT) * AAMD(IAM,IW,II)*
     &                           VAMDW(IAM,IW,II))
 1534       CONTINUE
 1535     CONTINUE
          DO 1537 ISSM = 1,NSSM(II)
            PMAKW(ISSM,IW,II) = 0.
            PMDKW(ISSM,IW,II) = 0.
            DO 1536 IMM = 1,N6
              PMAKW(ISSM,IW,II) = PMAKW(ISSM,IW,II) +
     &                            (SSMNLI(ISSM,IMM,II) *
     &                            AAMMA(IMM,IW,II) * VMMAW(IMM,IW,II))
              PMDKW(ISSM,IW,II) = PMDKW(ISSM,IW,II) +
     &                            (SSMNLI(ISSM,IMM,II) *
     &                            AAMMD(IMM,IW,II) * VMMDW(IMM,IW,II))
 1536       CONTINUE
 1537     CONTINUE
 1540   CONTINUE
 1550 CONTINUE
      IF (IPRB .EQ. 1) THEN
        WRITE(MOT,105)
        DO 1590 L = 1,2
          II = 3 - L
          N3 = NW(L)
          N4 = NAM(II)
          N5 = NAC(II)
          N6 = NMM(II)
          N7 = NSSM(II)
          WRITE(MOT,100) II,L
      DO 1580 IAM=1,N4
 1580 WRITE(MOT,22) (AAMA(IAM,IW,II),IW=1,N3)
      WRITE(MOT,101) II,L
      DO 1581 IAM=1,N4
 1581 WRITE(MOT,22) (AAMD(IAM,IW,II),IW=1,N3)
      WRITE(MOT,102) II,L
      DO 1582 IAC=1,N5
 1582 WRITE(MOT,22) (PAAKW(IAC,IW,II),IW=1,N3)
```

```
      WRITE(MOT,103) II,L
      DO 1583 IAC=1,N5
 1583 WRITE(MOT,22) (PADKW(IAC,IW,II),IW=1,N3)
      WRITE(MOT,140) II,L
      DO 1584 IMM=1,NMM(II)
 1584    WRITE(MOT,22) (AAMMA(IMM,IW,II),IW=1,N3)
      WRITE(MOT,141) II,L
      DO 1585 IMM=5,NMM(II)
 1585    WRITE(MOT,22) (AAMMD(IMM,IW,II),IW=1,N3)
      WRITE(MOT,142) II,L
      DO 1586 ISSM=1,NSSM(II)
 1586    WRITE(MOT,22) (PMAKW(ISSM,IW,II),IW=1,N3)
      WRITE(MOT,143) II,L
      DO 1587 ISSM=1,NSSM(II)
 1587 WRITE(MOT,22) (PMDKW(ISSM,IW,II),IW=1,N3)
 1590   CONTINUE
      ENDIF
C
C  ------------------------------------------------------------------
C 20) COMPUTE THE VALUE OF AN INDIVIDUAL WEAPON AND AN INDIVIDUAL
C     AIRCRAFT SORTIE BY ANTI-POTENTIAL POTENTIAL.
C  ------------------------------------------------------------------
C
      N3 = NW(1)
      N4 = NW(2)
      DO 2010 IW = 1,N3
        DO 2010 JW = 1,N4
          IADDR = (JW - 1) * N3 + IW
          BSUM(IADDR) = PWAKW(IW,JW,1)
          IADDR = (IW - 1) * N4 + JW
          RSUM(IADDR) = PWDKW(JW,IW,2)
 2010 CONTINUE
      CALL EIGENV(BSUM,RSUM,VIWASF(1,1),VIWACF(1,IS,1),VIWDCF(1,IS,2),
     &            N3,N4,IWUCEE,MNIE,EFCE,ALAM1,IFLAG)
      IF (IFLAG .EQ. 0) THEN
        DO 2015 IW = 1,N3
          DO 2015 JW = 1,N4
            IADDR = (JW - 1) * N3 + IW
            BSUM(IADDR) = PWDKW(IW,JW,1)
            IADDR = (IW - 1) * N4 + JW
            RSUM(IADDR) = PWAKW(JW,IW,2)
 2015   CONTINUE
        CALL EIGENV(BSUM,RSUM,VIWACF(1,IS,1),VIWDCF(1,IS,1),
     &            VIWACF(1,IS,2),N3,N4,IWUCEE,MNIE,EFCE,ALAM2,IFLAG)
      ENDIF
      IF (IFLAG .EQ. 1) THEN   ! BLUE'S REF WEAPON HAS NO TARGETS
        WRITE(MOT,1016) IS, ICYCLE
 1016   FORMAT(10(/),20X,' SECTOR: ',I3,'      CYCLE:',I3,5(/),
     &         20X,'BLUE'S REFERENCE WEAPON HAS NO TARGETS.')
        IF (ISATT .EQ. 1) THEN                  ! BLUE WAS SECTOR ATTACKER
          FRAD(IS)=999.
          IF (ISCEF(IS) .EQ. 0) THEN
            ISA(IS)=1
          ELSE
            ISA(IS) = - 1
          ENDIF
          WRITE(MOT,1017)
```

```
1017      FORMAT(/20X,'BLUE WAS ATTACKING AND WILL CONTINUE THE ',
     &                'ATTACK WITH A FRAD = 999.')
        ELSE                                ! RED IS THE SECTOR ATTACKER
          ISA(IS) = 0                       ! GO INTO HOLDING
          FRAC(IS)=0.
          KPS(IS)=6
          WRITE(MOT,1018)
1018      FORMAT(/20X,'RED WAS ATTACKING AND WILL GO INTO HOLDING.')
        ENDIF
        GOTO 9999
      ENDIF
      N5 = NAC(1)
      DO 2020 IAC = 1,N5
        DO 2020 JW = 1,N4
          IADDR = (JW - 1) * N5 + IAC
          BSUM(IADDR) = PAAKW(IAC,JW,1)
          RSUM(IADDR) = PADKW(IAC,JW,1)
2020  CONTINUE
      CALL MPROD(BSUM,VIWDCF(1,IS,2),VIAACF(1,IS,1),N5,N4,1)
      CALL MPROD(RSUM,VIWACF(1,IS,2),VIADCF(1,IS,1),N5,N4,1)
      DO 2025 IAC = 1,N5
        VIAACF(IAC,IS,1) = ALAM1 * VIAACF(IAC,IS,1)
        VIADCF(IAC,IS,1) = ALAM2 * VIADCF(IAC,IS,1)
2025  CONTINUE
      N5 = NAC(2)
      DO 2030 IAC = 1,N5
        DO 2030 IW = 1,N3
          IADDR = (IW - 1) * N5 + IAC
          BSUM(IADDR) = PAAKW(IAC,IW,2)
          RSUM(IADDR) = PADKW(IAC,IW,2)
2030  CONTINUE
      CALL MPROD(BSUM,VIWDCF(1,IS,1),VIAACF(1,IS,2),N5,N3,1)
      CALL MPROD(RSUM,VIWACF(1,IS,1),VIADCF(1,IS,2),N5,N3,1)
      DO 2035 IAC = 1,N5
        VIAACF(IAC,IS,2) = ALAM2 * VIAACF(IAC,IS,2)
        VIADCF(IAC,IS,2) = ALAM1 * VIADCF(IAC,IS,2)
2035  CONTINUE
      N6 = NSSM(1)
      DO 2040 ISSM = 1,N6
        DO 2040 JW = 1,N4
          IADDR = (JW - 1) * N6 + ISSM
          BSUM(IADDR) = PMAKW(ISSM,JW,1)
          RSUM(IADDR) = PMDKW(ISSM,JW,1)
2040  CONTINUE
      CALL MPROD(BSUM,VIWDCF(1,IS,2),VIMACF(1,IS,1),N6,N4,1)
      CALL MPROD(RSUM,VIWACF(1,IS,2),VIMDCF(1,IS,1),N6,N4,1)
      DO 2050 ISSM = 1,N6
        VIMACF(ISSM,IS,1) = ALAM1 * VIMACF(ISSM,IS,1)
        VIMDCF(ISSM,IS,1) = ALAM2 * VIMDCF(ISSM,IS,1)
2050  CONTINUE
      N6 = NSSM(2)
      DO 2060 ISSM = 1,N6
        DO 2060 IW = 1,N3
          IADDR = (IW - 1) * N6 + ISSM
          BSUM(IADDR) = PMAKW(ISSM,IW,2)
          RSUM(IADDR) = PMDKW(ISSM,IW,2)
2060  CONTINUE
```

```
      CALL MPROD(BSUM,VIWDCF(1,IS,1),VIMACF(1,IS,2),N6,N3,1)
      CALL MPROD(RSUM,VIWACF(1,IS,1),VIMDCF(1,IS,2),N6,N3,1)
      DO 2070 ISSM = 1,N6
        VIMACF(ISSM,IS,2) = ALAM2 * VIMACF(ISSM,IS,2)
        VIMDCF(ISSM,IS,2) = ALAM1 * VIMDCF(ISSM,IS,2)
 2070 CONTINUE
      IF (KPSMGA(15) .EQ. 1) THEN
        DO 2090 L = 1,2
          NN = NW(L)
          IENDW = 0
          DO WHILE (NN .GT. 0)
            ISTW = IENDW + 1
            IF (NN .GT. 12) THEN
              IENDW = IENDW + 12
            ELSE
              IENDW = IENDW + NN
            ENDIF
            NUMWPS = (IENDW - ISTW) + 1
            WRITE(MOT,106) L
            WRITE(MOT,146) ((AWT(IW,IWRD,L),IWRD=1,2),IW=ISTW,IENDW)
  146       FORMAT(1X,12(1X,2A4))
            WRITE(MOT,23) (VIWACF(IW,IS,L),IW = ISTW,IENDW)
   23       FORMAT(1X,12(1X,F8.3))
            NN = NN - NUMWPS
          ENDDO
          NN = NW(L)
          IENDW = 0
          DO WHILE (NN .GT. 0)
            ISTW = IENDW + 1
            IF (NN .GT. 12) THEN
              IENDW = IENDW + 12
            ELSE
              IENDW = IENDW + NN
            ENDIF
            NUMWPS = (IENDW - ISTW) + 1
            WRITE(MOT,107) L
            WRITE(MOT,146) ((AWT(IW,IWRD,L),IWRD=1,2),IW=ISTW,IENDW)
            WRITE(MOT,23) (VIWDCF(IW,IS,L),IW = ISTW,IENDW)
            NN = NN - NUMWPS
          ENDDO
          N3 = NAC(L)
          WRITE(MOT,108) L
          WRITE(MOT,22) (VIAACF(IAC,IS,L),IAC = 1,N3)
          WRITE(MOT,109) L
          WRITE(MOT,22) (VIADCF(IAC,IS,L),IAC = 1,N3)
          WRITE(MOT,144) L
          WRITE(MOT,22) (VIMACF(ISSM,IS,L),ISSM = 1,NSSM(L))
          WRITE(MOT,145) L
          WRITE(MOT,22) (VIMDCF(ISSM,IS,L),ISSM = 1,NSSM(L))
 2090   CONTINUE
      ENDIF
C
C ------------------------------------------------------------------
C 25) CALCULATE TOE AND CURRENT WEAPON VALUES, EFFECTIVENESS OF DIVISION
C     IN ACTIVE BATTLE AREAS, AND GROUND VALUES ON ATTACK AND DEFENSE
C ------------------------------------------------------------------
C
```

```
 2500 N2 = 0
      KPI = KPS(IS)
      DO 2530 L = 1,2
        IF (NDS(IS,L) .GT. 0) THEN
          N1 = N2 + 1
          N2 = N2 + NDS(IS,L)
          N3 = NW(L)
          DO 2525 IDS = N1,N2
            ID = IDLABA(IDS,IS)
            IT = ITD(ID)
C
C  MAKE SURE NO HIGHER ECHELON UNITS ARE ON THE FEBA
C
            IF (IT .EQ. -1) GOTO 2525
            IC = ICBIT(ID)
            WVDAC(ID) = 0.
            WVDDC(ID) = 0.
            WVDACI    = 0.
            WVDDCI    = 0.
            WVDAT     = 0.
            WVDDT     = 0.
C
C COMPUTE DISTANCE UNIT IS FROM THE FEBA
C
            DIST = ABS(FEBA(IS) - CDVLOC(ID))
            FRACW = (DFBACT(L) - DIST)/DFBACT(L)
C
C COMPUTE WEAPONS VALUES FOR DIVISION ID. WVDAC, WVDDC ARE THE WEAPONS VALUES
C FOR THE DIVISION'S WEAPONS ON-HAND WITHOUT ADJUSTING FOR TERRAIN RESTRICTIONS.
C WVDACI, WVDDCI ARE THE VALUES FOR ON-HAND WEAPONS ADJUSTING FOR TERRAIN
C RESTRICTIONS.
C
            DO 2505 IWIC = 1,NWTIWC(1,L)    ! NUMBER OF WEAPON TYPES IN CLASS 1
              IW        = IWTIWC(IWIC,1,L)
              WVDAC(ID) = WVDAC(ID) + VIWACF(IW,IS,L) *
     &                    (WDIV(IW,ID) * FRACW)
              WVDDC(ID) = WVDDC(ID) + VIWDCF(IW,IS,L) *
     &                    (WDIV(IW,ID) * FRACW)
              WVDAT     = WVDAT     + VIWACF(IW,IS,L) * BWD(IW,ID)
              WVDDT     = WVDDT     + VIWDCF(IW,IS,L) * BWD(IW,ID)
C
C  TERRAIN ADJUSTMENT:
C
C   VIWACF AND VIWDCF CONTAIN THE VALUES OF INDIVIDUAL WEAPONS USING THE NEW
C   MIX OF WEAPONS DUE TO TERRAIN RESTRICTIONS. THESE VALUES ESSENTIALLY
C   ADJUST THE NUMBER OF TARGETS IN THE RESTRICTED TERRAIN. NOW THE NUMBER OF
C   FIRES MUST BE ADJUSTED. THE MAXIMUM NUMBER OF FIRERS THAT CAN FIT IS
C   OBTAINED BY MULTIPLYING THE TERRAIN ADJUSTMENT FACTOR BY THE TOE NUMBER OF
C   WEAPONS. THE NUMBER OF FIRERS IS FOUND BY TAKING THE MINIMUM OF THIS NUMBER
C   AND THE NUMBER OF WEAPONS ON-HAND.
C
              WTFITA = FRRING(IT,1,KTI) * TWD(IW,IT)
              WTFITA = (AMIN1(WTFITA,WDIV(IW,ID)) * FRACW)
              WTFITD = FRRING(IT ,KPI,KTI) * TWD(IW,IT)
              WTFITD = (AMIN1(WDIV(IW,ID),WTFITD) * FRACW)
              WVDACI = WVDACI + VIWACF(IW,IS,L) * WTFITA
              WVDDCI = WVDDCI + VIWDCF(IW,IS,L) * WTFITD
```

```
 2505       CONTINUE
C
C ADD IN REST OF WEAPON TYPES (NOT AFFECTED BY TERRAIN)
C
            DO 2506 IWPC = 2,LNWPC
              IF (NWTIWC(IWPC,L) .NE. 0) THEN
                DO IWIC = 1, NWTIWC(IWPC,L)
                  IW       = IWTIWC(IWIC,IWPC,L)
                  WVDAT    = WVDAT     + VIWACF(IW,IS,L) * BWD(IW,ID)
                  WVDDT    = WVDDT     + VIWDCF(IW,IS,L) * BWD(IW,ID)
                  IF (ERGMAX(IW,L) .EQ. 0.) THEN
                    WVDAC(ID) = WVDAC(ID) + VIWACF(IW,IS,L) *
     &                          WDIV(IW,ID) * FRACW
                    WVDDC(ID) = WVDDC(ID) + VIWDCF(IW,IS,L) *
     &                          WDIV(IW,ID) * FRACW
                    WVDACI    = WVDACI    + VIWACF(IW,IS,L) *
     &                          WDIV(IW,ID) * FRACW
                    WVDDCI    = WVDDCI    + VIWDCF(IW,IS,L) *
     &                          WDIV(IW,ID) * FRACW
                  ELSE IF (DIST .LE. ERGMAX(IW,L)) THEN
                    WVDAC(ID) = WVDAC(ID) + VIWACF(IW,IS,L) *
     &                          WDIV(IW,ID)
                    WVDDC(ID) = WVDDC(ID) + VIWDCF(IW,IS,L) *
     &                          WDIV(IW,ID)
                    WVDACI    = WVDACI    + VIWACF(IW,IS,L) *
     &                          WDIV(IW,ID)
                    WVDDCI    = WVDDCI    + VIWDCF(IW,IS,L) *
     &                          WDIV(IW,ID)
                  ENDIF
                ENDDO
              ENDIF
 2506       CONTINUE
C
C  CALCULATE THE EFFECTIVENESS OF PERSONNEL AND WEAPONS.
C
            PPS = PDIV(ID) / BPD(ID)
            CURINP = PPS
            CALL CVFW(NEAEF(IC),XAEF(1,IC),YAEF(1,IC))
            PEA = CURVES
            PEA = PEA * TNGMOD(ID)
            CURINP = PPS
            CALL CVFW(NEDEF(IC),XDEF(1,IC),YDEF(1,IC))
            PED = CURVES
            PED = PED * TNGMOD(ID)
            WATS = 0.
            WDTS = 0.
            IF (WVDAT .GT. 0.) WATS = WVDAC(ID) / WVDAT
            IF (WVDDT .GT. 0.) WDTS = WVDDC(ID) / WVDDT
            CURINP = WATS
            CALL CVFW(NWAEFF(IC),XWAEF(1,IC),YWAEF(1,IC))
            WEA = CURVES
            WEA = WEA * TNGMOD(ID)
            CURINP = WDTS
            CALL CVFW(NWDEFF(IC),XWDEF(1,IC),YWDEF(1,IC))
            WED = CURVES
            WED = WED * TNGMOD(ID)
            EDAXSR(ID) = AMIN1(WEA,PEA)
```

```
                EDDXSR(ID) = AMIN1(WED,PED)
C
C     CALCULATE EFFECTIVENESS REDUCTION DUE TO SUPPLY SHORTAGE.
C
                TEMP1 = 0.
                TEMP2 = 0.
                IF (ISEFFD .LE. 2) THEN
                  SEF = 0.
C
C SUPPLY CONSUMPTION RATES ARE BASED ON TOE SIZE UNITS. TO CONVERT THESE RATES
C TO A PARTICULAR SIZE UNIT, THE CONSUMPTION RATE IS MULTIPLIED BY THE
C BASE TO TOE PERSONNEL RATIO. THIS METHOD TREATS SUPPLY CONSUMPTION AS
C TONS PER MAN PER DAY. A BETTER REPRESENTATION WOULD TO USE A WEAPON
C RATIO FOR SUPPLY TYPES BASED ON WEAPONS AND A PERSONNEL RATIO FOR
C PERSONNEL SUPPLIES. TO DO THIS A WEIGHTING SCHEME WOULD HAVE TO BE
C ESTABLISHED TO RELATE SUPPLY CONSUMPTION BY SUPPLY TYPE TO WEAPON TYPE.
C
                  BTPRAT = BPD(ID) / TPD(IT)
                  DO 2510 ISPT = 1,NSPT
                    TEMP1 = TEMP1 + SDIV(ID,ISPT)
                    APCSD = PCSD(1,IT,ISPT) * BTPRAT ! ADJUSTED CONSUMPTION RATE
                    TEMP2 = TEMP2 + APCSD
                    DSH = SDIV(ID,ISPT) / APCSD
                    CURINP = DSH
                    CALL CVFW(NSEFF(L),XSEFF(1,ISPT,L),YSEFF(1,ISPT,L))
                    TEMP = CURVES
                    SEF = SEF + FDVVST(IT,ISPT)*TEMP
 2510             CONTINUE
                  IF (ISEFFD .EQ. 1) THEN
                    EFFDA(ID) = SEF * EDAXSR(ID)
                    EFFDD(ID) = SEF * EDDXSR(ID)
                  ELSE  ! ISEFFD = 2
                    EFFDA(ID) = AMIN1(SEF,WEA,PEA)
                    EFFDD(ID) = AMIN1(SEF,WED,PED)
                  ENDIF
                ELSE ! ISEFFD = 3
                  SEF = 1.
                  EFFDA(ID) = AMIN1(WEA,PEA)
                  EFFDD(ID) = AMIN1(WED,PED)
                ENDIF
                IF (IOMU .NE. 3 .AND. IOMU .NE. 5) THEN !DEGRADE FOR CHEM USE
                  EFFDA(ID) = EFFDA(ID) * FDEFCP(ID)
                  EFFDD(ID) = EFFDD(ID) * FDEFCP(ID)
                ENDIF
                PPSAR(ID) = PPS
                PEAAR(ID) = PEA
                PEDAR(ID) = PED
                WATSAR(ID) = WATS
                WDTSAR(ID) = WDTS
                WEAAR(ID) = WEA
                WEDAR(ID) = WED
                DSHAR(ID) = 0.
                IF (TEMP2 .NE. 0) DSHAR(ID) = TEMP1 / TEMP2
                SEFAR(ID)  = SEF
                VDAC(ID) = EFFDA(ID) * WVDAT
                VDDC(ID) = EFFDD(ID) * WVDDT
                VGABA(IS,L) = VGABA(IS,L) + VDAC(ID)
```

```
            VGDBA(IS,L) = VGDBA(IS,L) + VDDC(ID)
C
C COMPUTE THE VALUE OF THE GROUND FORCES IN THE RESTRICTED TERRAIN.
C  FFF IS THE FRACTIONAL REDUCTION OF SIDE L'S GROUND FORCES DUE TO TERRAIN
C RESTRICTIONS.
C
            FFF = 1.0
            IF (WVDAC(ID) .GE. .0001) FFF = WVDACI / WVDAC(ID)
            VGABAI(IS,L) = VGABAI(IS,L) + (FFF * VDAC(ID))
            FFF = 1.0
            IF (WVDDC(ID) .GE. .0001) FFF = WVDDCI / WVDDC(ID)
            VGDBAI(IS,L) = VGDBAI(IS,L) + (FFF * VDDC(ID))
C
            IF (KPSMGA(15) .EQ. 1) THEN
              WRITE(MOT,110)
              WRITE(MOT,10) ID,IT
              WRITE(MOT,111)
              WRITE(MOT,22) WVDAC(ID),WVDDC(ID),WVDACI, WVDDCI,
     &              WVDAT, WVDDT, EDAXSR(ID),
     &              EDDXSR(ID), EFFDA(ID), EFFDD(ID), VDAC(ID),
     &              VDDC(ID)
              WRITE(MOT,112)
              WRITE(MOT,22) PEA,PED,DSH,SEF
            ENDIF
 2525     CONTINUE
        ENDIF             ! IF NDS(IS,L) > 0
 2530 CONTINUE
      IF(KPSMGA(15) .EQ. 1) THEN
        WRITE(MOT,113)
        WRITE(MOT,22) (VGABA(IS,L),VGDBA(IS,L),L = 1,2)
      ENDIF
C     ------------------------------------------------------------------
C 30) CALCULATE AIR VALUES ON ATTACK AND DEFENSE
C     ------------------------------------------------------------------
      DO 3020 L = 1,2
        VAABA(IS,L) = 0.
        VADBA(IS,L) = 0.
        N3 = NAC(L)
        DO 3010 IAC = 1,N3
          VAABA(IS,L) = VAABA(IS,L)+ACSABA(IAC,IS,L)*VIAACF(IAC,IS,L)
          VADBA(IS,L) = VADBA(IS,L)+ACSABA(IAC,IS,L)*VIADCF(IAC,IS,L)
 3010   CONTINUE
        IF (IPRB .EQ. 1) THEN
          WRITE(MOT,9000)IS,L,(ACSABA(IAC,IS,L),IAC = 1,N3)
 9000     FORMAT(' ACSABA--SECTOR ',I5,' SIDE ',I2,7(2X,F10.2))
        ENDIF
 3020 CONTINUE
C     ------------------------------------------------------------------
C 31) CALCULATE SSM VALUES ON ATTACK AND DEFENSE
C     ------------------------------------------------------------------
      DO 3120 L = 1,2
        VMABA(IS,L) = 0.
        VMDBA(IS,L) = 0.
        N6 = NSSM(L)
        DO 3110 ISSM = 1,N6
          VMABA(IS,L) = VMABA(IS,L)+SSMALO(ISSM,IS,L)*VIMACF(ISSM,IS,L)
          VMDBA(IS,L) = VMDBA(IS,L)+SSMALO(ISSM,IS,L)*VIMDCF(ISSM,IS,L)
```

```
 3110   CONTINUE
 3120 CONTINUE
C
        IF (IPRB .EQ. 1) THEN
          WRITE(MOT,114)
          WRITE(MOT,22) (VAABA(IS,L),VADBA(IS,L),L = 1,2)
          WRITE(MOT,135)
          WRITE(MOT,22)(VMABA(IS,L),VMDBA(IS,L),L = 1,2)
        ENDIF
C ----------------------------------------------------------------------
C 35) COMPUTE THE SECTOR ATTACKER IF THERE IS AN ATTACK IN SECTOR IS.
C ----------------------------------------------------------------------
        KP    = KPS(IS)
        ISATT = ISAT(ISA(IS),IS)
        II = 3 - ISATT
        IF (ICSA(IS) .EQ. 0) THEN
          IF (VGDBAI(IS,II) + VADBA(IS,II) + VMDBA(IS,II).LE.0.0) THEN
            IF (ISCEF(IS) .EQ. 0) THEN
              ISA(IS) = ISATT  ! SIDE II IS DEFENSELESS
            ELSE
              ISA(IS) = -ISATT ! SECTOR ATTACKER IS FLANK CONSTRAINED.
            ENDIF
          ELSE
            IF (VGDBAI(IS,ISATT) + VADBA(IS,ISATT) +
     &                    VMDBA(IS,ISATT).LE.0.0) THEN
              ISA(IS) = II
C                  ! SECTOR ATTACKER IS DEFENSELESS SO SECTOR ATKR II
            ELSE
              FRAD(IS) = (VGABAI(IS,ISATT) + VAABA(IS,ISATT) +
     &                                    VMABA(IS,ISATT)) /
     &                    (VGDBAI(IS,II) + VADBA(IS,II) + VMDBA(IS,II))
              IF (FRAD(IS) .GT. 999.9) FRAD(IS) = 999.9
              IFLAG=1
              IF (FRAD(IS).GE.FRATA(KP,ISATT) .AND. ISCEF(IS) .EQ. 0) THEN
C
C  ISATT ATTACKER HAS ENOUGH FORCE RATIO TO ATTACK AND IS NOT FLANK CONS
C
                ISA(IS) = ISATT
              ELSE
C
C SECTOR ATTACKER DOES NOT HAVE ENOUGH COMBAT POWER OR IS FLANK CONSTRAI
C  DOES SECTOR DEFENDER HAVE ENOUGH POWER TO TAKE THE ATTACK
C
                IF (FRAD(IS) .GE. FRATA(KP,ISATT) .AND.
     1            ISCEF(IS) .NE. 0) IFLAG = 2
                TMPFRD = (VGABAI(IS,II) + VAABA(IS,II) + VMABA(IS,II)) /
     1                   (VGDBAI(IS,ISATT) + VADBA(IS,ISATT) +
     &                    VMDBA(IS,ISATT))
                IF (TMPFRD .GT. 999.9) TMPFRD = 999.9
                IF (TMPFRD .GE. FRATD(KP,II)) THEN
C
C THEATER DEFENDER HAS ENOUGH COMBAT POWER TO TAKE THE ATTACK AND BECOME
C ATTACKER.
C
                  ISA(IS) = II
                  FRAD(IS) = TMPFRD
                ELSE
```

```
                 IF (IFLAG .EQ. 1) THEN
                  ISA(IS) = 0
      C                      ! NEITHER SIDE HAS ENOUGH COMBAT POWER TO AT
                 ELSE
                  ISA(IS) = - ISATT
      C                      ! ISATT CAN ATTACK BUT IS FLANK RESTR
                 ENDIF
                ENDIF
               ENDIF
              ENDIF
             END IF
            ELSE
             IF (VGDBAI(IS,ISATT) + VADBA(IS,ISATT) +
     &                   VMDBA(IS,ISATT).LE.0.0) THEN
              ISA(IS) = II
              ICSA(IS) = 0
      C             ! SECTOR ATTACKER IS DEFENSELESS SO SECTOR ATKR II
             ELSE
              FRAD(IS) = (VGABAI(IS,ISATT) + VAABA(IS,ISATT) +
     &                                VMABA(IS,ISATT)) /
     &                  (VGDBAI(IS,II) + VADBA(IS,II) + VMDBA(IS,II))
              IF (FRAD(IS) .GT. 999.9) FRAD(IS) = 999.9
              IF (FRAD(IS).GE.FRATA(KP,ISATT)) THEN
      C
      C  ISATT ATTACKER HAS ENOUGH FORCE RATIO TO ATTACK
      C
                ISA(IS) = ISATT
              ELSE
      C
      C SECTOR ATTACKER DOES NOT HAVE ENOUGH COMBAT POWER
      C  DOES SECTOR DEFENDER HAVE ENOUGH POWER TO TAKE THE ATTACK
      C
               TMPFRD = (VGABAI(IS,II) + VAABA(IS,II) + VMABA(IS,II)) /
     1                  (VGDBAI(IS,ISATT) + VADBA(IS,ISATT) +
     &                   VMDBA(IS,ISATT))
               IF (TMPFRD .GT. 999.9) TMPFRD = 999.9
               IF (TMPFRD .GE. FRATD(KP,II)) THEN
      C
      C THEATER DEFENDER HAS ENOUGH COMBAT POWER TO TAKE THE ATTACK AND BECOME
      C ATTACKER.
      C
                ISA(IS) = II
                FRAD(IS) = TMPFRD
               ELSE
                ISA(IS) = 0
               END IF
               ICSA(IS) = 0
              END IF
             END IF
            ENDIF
      C
      C SET ISA = -3 IF THE SECTOR ATTACKER IS BLUE BUT THEY HAVE REACHED THE INITIAL FEBA
      C AND THE FLAG "KSTOPB" IS SET SO THEY CAN'T GO FURTHER.
      C
            IF (KSTOPB .EQ. 1 .AND. ISA(IS) .EQ. 1 .AND.
     1                         FEBA(IS) .LE. FEBATZ(IS)) THEN
             ISA(IS) = -3
```

```
            ICSA(IS) = 0
         END IF
C
C  SET ISA = -4 IF SIDE 1 IS THE SECTOR ATTACKER BUT THE IHOLD FLAG IS SET
C  SET ISA = -5 IF SIDE 2 IS THE SECTOR ATTACKER BUT THE IHOLD FLAG IS SET
C
         IF (ISA(IS) .EQ. 1 .AND. IHOLD(1) .EQ. 1) ISA(IS) = -4
         IF (ISA(IS) .EQ. 2 .AND. IHOLD(2) .EQ. 1) ISA(IS) = -5
C
C SAVE THE LAST SECTOR ATTACKER
C
         ISATT = ISAT(ISA(IS),IS)
         IF (ISATT .NE. ISAP(IS)) THEN
           ISAP(IS) = ISATT
         ENDIF
C
C SET ISA = -6 IF THERE IS A CHANGE IN COMBAT MODE FOR EITHER SIDE
C
         IF (ICMST(IS,1).GT.0.OR.ICMST(IS,2).GT.0) ISA(IS) = -6
C
         IF (IPRB .EQ. 1) THEN
           WRITE(MOT,115)
           WRITE(MOT,22) FRAD(IS)
           WRITE(MOT,132)
           WRITE(MOT,10) ISA(IS)
         ENDIF
C      ______________________________________________________________________
C 40) CALCULATE EFFECTIVENESS REDUCTION DUE TO SUPPLY SHORTAGE IN SECTOR
C      ______________________________________________________________________
         PPESE = -999.
         N2 = 0
         DO 4020 L = 1,2
           IF (NDS(IS,L) .GT .0) THEN
             N1 = N2+1
             N2 = NDS(IS,L) + N2
             SEF = 0.
             DO 4010 IDS = N1,N2
               ID = IDLABA(IDS,IS)
C
C  MAKE SURE NO HIGHER ECHELON UNITS ARE ON THE FEBA/ABA
C
               IF (ITD(ID) .EQ. -1) GOTO 4010
               SEF = SEF + SEFAR(ID)
 4010        CONTINUE
             SEF = SEF / NDS(IS,L)
C
C  PPESE IS USED TO SCALE CASUALTIES BASED ON THE RATIO OF THE SIDE WITH THE
C  GREATEST SEF AND THAT SIDE'S 100% SEF.
C
             PPESE = AMAX1(PPESE,SEF)
             PPESAR(IS,L) = PPESE
           ENDIF
 4020 CONTINUE
C
         IF (IPRB .EQ. 1) THEN
           WRITE(MOT,116)
           WRITE(MOT,22)  PPESE,DSH
```

```
            ENDIF
C
C 45) COMPUTE VALUE LOST FOR BOTH SIDES.
C
C     ADJA, ADJD ARE ADJUSTMENT FACTORS USED TO ADJUST THE CASUALTY PERCENTAGES
C     BASED ON THE GROUND FORCES VALUE REDUCTIONS FOR FAIR AND POOR TERRAIN.
C
C     VDI, VAI ARE REDUCTION FACTORS FOR GROUND FORCES ON FAIR AND POOR
C     TERRAIN IN RELATION TO IF THEY WERE ON GOOD TERRAIN.
C
        FRCA = 999.9
        FRCD = 999.9
        ADJA = 1.0
        ADJD = 1.0
        VDI = 0.
        VAI = 0.
        L = ISATT
        II = 3 - L
        TEMP = VGDBAI(IS,II) + VADBA(IS,II) + VMDBA(IS,II)
        IF(TEMP .GT. .0001) THEN
          VAFPD = VADBA(IS,II) / TEMP   ! FRACTION DUE TO AIR FOR DEFENDER
          VMFPD = VMDBA(IS,II) / TEMP   ! FRACTION DUE TO SSM'S FOR DEFENDER
          IF (VGDBA(IS,II) .GT. .001) VDI = VGDBAI(IS,II) /
     &                                          VGDBA(IS,II)
          FRCA = (VGABAI(IS,L) + FASFRC * VAABA(IS,L) +
     &           VMABA(IS,L)) / TEMP
          TEMP1 = VGDBAI(IS,II) + (FDSFRC * VADBA(IS,II)) + VMDBA(IS,II)
          IF (TEMP1 .GT. .0001) THEN
            FRCD = (VGABAI(IS,L) + VAABA(IS,L) + VMABA(IS,L)) / TEMP1
            IF (FRCD .GT. .0001) THEN
              VAFPA = VAABA(IS,L) / (FRCD * TEMP1)
              VMFPA = VMABA (IS,L) / (FRCD * TEMP1)
              IF (VGABA(IS,L) .GT. .0001)
     &                             VAI = VGABAI(IS,L) / VGABA(IS,L)
              ADJD = VAFPA + VMFPA + VDI * (1-(VAFPA+VMFPA))
C
C                         VALUE DUE TO GROUND ATTACKER
C VDI * VALUE DUE TO ATTACKER'S GROUND TAKES INTO ACCOUNT THE REDUCED NUMBER
C OF TARGETS THAT SIDE L'S GROUND WEAPONS HAVE TO SHOOT AT IN FAIR OR POOR GND
C
            ENDIF
            ADJA = VAFPD + VMFPD + VAI * (1-(VAFPD+VMFPD))
          ENDIF
        ENDIF
        IF (ISA(IS) .EQ. 0) THEN
          KPCAS = 6
        ELSE
          KPCAS = KPS(IS)
        ENDIF
        N4 = NPCAF(L)
        N5 = NPCDF(II)
        DO 4511 IPCAF = 1,N4
          TYPCAF(IPCAF) = YPCAF(KPCAS,IPCAF,L)
 4511   CONTINUE
        DO 4512 IPCDF = 1,N5
          TYPCDF(IPCDF) = YPCDF(KPCAS,IPCDF,II)
 4512   CONTINUE
```

```
C
C GET THE CASUALTY PERCENTAGE FROM THE FORCE RATIO AND COMPUTE VALUE LOST FOR
C THE ATTACKER.
C
        CURINP = FRCA
        CALL CVFW(NPCAF(L),XPCAF(1,L),TYPCAF)
        PCFR = CURVES
        PCS(L) = PCFR * PPESE * ADJA
        VLS(L) = PCS(L) * VGABA(IS,L)  !VALUE LOST DUE TO CASUALTIES
        VLS(L) = FCVLS(L) * VLS(L)
C
C COMPUTE CASUALTIES AND VALUE LOST FOR THE DEFENDER
C
        CURINP = FRCD
        CALL CVFW(NPCDF(II),XPCDF(1,II),TYPCDF)
        PCFR = CURVES
        PCS(II) = PCFR * PPESE * ADJD
        VLS(II) = PCS(II) * VGDBA(IS,II)
        VLS(II) = FCVLS(II) * VLS(II)
        FRCAR(IS,L) = FRCA
        FRCAR(IS,II) = FRCD
        PCSAR(IS,L) = PCS(L)
        PCSAR(IS,II) = PCS(II)
        VLSAR(IS,L) = VLS(L)
        VLSAR(IS,II) = VLS(II)
C
        IF(IPRB .EQ. 1) THEN
          WRITE(MOT,117)
          WRITE(MOT,22) FRCA,FRCD,PCFR
          WRITE(MOT,118)
          WRITE(MOT,22) (VLS(L),L = 1,2),(PCS(L),L = 1,2)
        ENDIF
C
C 54) COMPUTE TONS OF SUPPLIES CONSUMED BY BOTH SIDES AND NEW SUPPLY
C     INVENTORIES.
C
      N2 = 0
      DO 5450 L = 1,2
        N1 = N2 + 1
        N2 = N2 + NDS(IS,L)
        DO 5405 ISPT = 1,NSPT
          TSC(ISPT,L) = 0.
5405    CONTINUE
        IF(NDS(IS,L) .GT. 0) THEN
          DO 5430 IDS = N1,N2
            ID = IDLABA(IDS,IS)
            IC = ICBIT(ID)
            IT = ITD(ID)
C
C  MAKE SURE NO HIGHER ECHELON UNITS ARE PROCESSED
C
            IF (IT .EQ. -1) GOTO 5430
C
C AS BEFORE CONSUMPTION RATES MUST BE ADJUSTED, USE BASE TO TOE PERSONNEL
C RATIO AGAIN.
C
            BTPRAT = BPD(ID) / TPD(IT)
```

```
            TEMP   = PDIV(ID) / BPD(ID)
            IF (ISATT .NE. L) THEN
              TEMP2 = EDDXSR(ID)           !EDDXSR=> AMIN1(WED,PED)
            ELSE
              TEMP2 = EDAXSR(ID)
            ENDIF
            DO 5410 ISPT = 1,NSPT
              IF (ISA(IS) .NE. L) THEN
                 TEMP3 = CSDDP(IT,KPCAS,ISPT)
              ELSE
                 TEMP3 = CSDAP(IT,KPCAS,ISPT)
              ENDIF
              TEMP1 = AMAX1(TEMP2 * ( TEMP3 * BTPRAT),
     &                  TEMP * (CSDR(1,IT,ISPT) * BTPRAT))
              TEMP1 = AMIN1(TEMP1,SDIV(ID,ISPT))
              SDIV(ID,ISPT) = SDIV(ID,ISPT) - TEMP1
              TSC(ISPT,L) = TSC(ISPT,L) + TEMP1
              CTSCD(1,ISPT,IC) = CTSCD(1,ISPT,IC) + TEMP1
 5410       CONTINUE
 5430     CONTINUE
        ENDIF
 5450 CONTINUE
      IF (IPRB .EQ. 1) THEN
        WRITE(MOT,128)
        WRITE(MOT,22) ((TSC(ISPT,L),ISPT = 1,NSPT),L = 1,2)
      ENDIF
C  ------------------------------------------------------------------
C 60) CALCULATE WEAPONS LOST BY TYPE.
C  ------------------------------------------------------------------
      DO 6060 L = 1,2
        II = 3 - L
        N2 = NW(L)
        N3 = NW(L)
        N4 = NW(II)
        N5 = NAC(II)
        N6 = NSSM(II)
        TEMP = 0.
C ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
C                    MVCASO = 0  USE APP METHOD
C ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        IF (MVCASO .NE. 1) THEN
          IF (ISATT .NE. L) THEN
            DO 6010 IW = 1,N2
              SUMMW(IW) = 0.
              DO 6005 KW = 1,N4
                SUMMW(IW) = SUMMW(IW) + WSI(KW,IS,II) * PWAKW(KW,IW,II)
 6005         CONTINUE
              DO 6006 IAC = 1,N5
                SUMMW(IW) = SUMMW(IW) + ACSABA(IAC,IS,II) *
     &                     PAAKW(IAC,IW,II)
 6006         CONTINUE
              DO 6007 ISSM = 1,N6
                SUMMW(IW) = SUMMW(IW) + (SSMALO(ISSM,IS,II) *
     &                     PMAKW(ISSM,IW,II))
 6007         CONTINUE
              TEMP = TEMP + SUMMW(IW) * VIWDCF(IW,IS,L)
 6010       CONTINUE
```

```
              IF (ISATT .NE. 0) THEN
                SFAPP(L) = SFAPP(L) + (VLS(L)/TEMP)
                NUMINC(L) = NUMINC(L) + 1
              ENDIF
              VFACTOR = VLS(L)/TEMP
              DO 6020 IW = 1,N3
                WLS(IW,IS,L) = 0.0
                DGRD(IW) = 0.0
                DO 6015 KW = 1,N4
                  GKGS(KW,IW,II) = (VLS(L) * WSI(KW,IS,II) *
     &                              PWAKW(KW,IW,II))/TEMP
                  DGRD(IW) = DGRD(IW) + GKGS(KW,IW,II)
 6015           CONTINUE
                DAIR(IW) = 0.0
                DO 6016 IAC = 1,N5
                  AKGS(IAC,IW,II) = (VLS(L) * ACSABA(IAC,IS,II) *
     &                                    PAAKW(IAC,IW,II)) / TEMP
C
C     ---------------------------------------------------------------
C       SPECIAL CAS EFFECT ADJUSTMENT
C     ---------------------------------------------------------------
C
                  AKGS(IAC,IW,II) = AKGS(IAC,IW,II) * FICAS(2,II)
                  DAIR(IW) = DAIR(IW) + AKGS(IAC,IW,II)
 6016           CONTINUE
                DSSM(IW) = 0.0
                DO 6017 ISSM = 1,N6
                  XMKGS(ISSM,IW,II) = (VLS(L) * SSMALO(ISSM,IS,II) *
     &                                 PMAKW(ISSM,IW,II)) / TEMP
                  DSSM(IW) = DSSM(IW) + XMKGS(ISSM,IW,II)
 6017           CONTINUE
                WLS(IW,IS,L) = DGRD(IW) + DAIR(IW) + DSSM(IW)
 6020         CONTINUE
            ELSE
              DO 6035 IW = 1,N2
                SUMMW(IW) = 0.
                DO 6030 KW = 1,N4
                  SUMMW(IW) = SUMMW(IW) + WSI(KW,IS,II) * PWDKW(KW,IW,II)
 6030           CONTINUE
                DO 6031 IAC = 1,N5
                  SUMMW(IW) = SUMMW(IW) + ACSABA(IAC,IS,II) *
     &                        PADKW(IAC,IW,II)
 6031           CONTINUE
                DO 6032 ISSM = 1,N6
                  SUMMW(IW) = SUMMW(IW) + (SSMALO(ISSM,IS,II) *
     &                        PMDKW(ISSM,IW,II))
 6032           CONTINUE
                TEMP = TEMP + SUMMW(IW) * VIWACF(IW,IS,L)
 6035         CONTINUE
              SFAPP(L) = SFAPP(L) + (VLS(L)/TEMP)
              NUMINC(L) = NUMINC(L) + 1
              VFACTOR = VLS(L) /TEMP
              DO 6044 IW = 1,N3
                WLS(IW,IS,L) = 0.0
                DGRD(IW) = 0.0
                DO 6040 KW = 1,N4
                  GKGS(KW,IW,II) = (VLS(L) * WSI(KW,IS,II) *
```

```
     &                           PWDKW(KW,IW,II)) / TEMP
            DGRD(IW) = DGRD(IW) + GKGS(KW,IW,II)
 6040     CONTINUE
          DAIR(IW) = 0.0
          DO 6041 IAC = 1,N5
            AKGS(IAC,IW,II) = (VLS(L) * ACSABA(IAC,IS,II) *
     &                           PADKW(IAC,IW,II)) / TEMP
            AKGS(IAC,IW,II) = AKGS(IAC,IW,II) * FICAS(2,II)
            DAIR(IW) = DAIR(IW) + AKGS(IAC,IW,II)
 6041     CONTINUE
          DSSM(IW) = 0.0
          DO 6042 ISSM = 1,N6
            XMKGS(ISSM,IW,II) = (VLS(L) * SSMALO(ISSM,IS,II) *
     &                            PMDKW(ISSM,IW,II)) / TEMP
            DSSM(IW) = DSSM(IW) + XMKGS(ISSM,IW,II)
 6042     CONTINUE
          WLS(IW,IS,L) = DGRD(IW) + DAIR(IW) + DSSM(IW)
 6044   CONTINUE
      ENDIF
C
C
C         ADJUST GKGS,AKGS, AND XMKGS
C
        DO 6045 IW=1,N3
          IF (WLS(IW,IS,L) .GT. WS(IW,L)) THEN
            DGRD(IW) = 0.0
            FRAC = WSI(IW,IS,L)/WLS(IW,IS,L)
            DO 6037 KW=1,N4
              GKGS(KW,IW,II) = GKGS(KW,IW,II)*FRAC    ! GROUND VS GROUND
              DGRD(IW) = DGRD(IW) + GKGS(KW,IW,II)
 6037       CONTINUE
            DAIR(IW) = 0.0
            FRAC = WS(IW,L)/WLS(IW,IS,L)
            DO 6038 IAC=1,N5
              AKGS(IAC,IW,II) = AKGS(IAC,IW,II)*FRAC    ! GROUND VS CAS
              DAIR(IW) = DAIR(IW) + AKGS(IAC,IW,II)
 6038       CONTINUE
            DSSM(IW) = 0.0
            DO 6039 ISSM=1,N6
              XMKGS(ISSM,IW,II) = XMKGS(ISSM,IW,II)*FRAC    ! GROUND VS MISSILE
              DSSM(IW) = DSSM(IW) + XMKGS(ISSM,IW,II)
 6039       CONTINUE
            WLS(IW,IS,L) = DGRD(IW) + DAIR(IW) + DSSM(IW)
          ENDIF
 6045   CONTINUE
C
      ELSE
C
C ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
C                   MVCASO = 1  USES INPUT SCALE FACTORS
C ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
C
C     ______________________________________________________________________
C      ALTERNATE METHOD OF COMPUTING GROUND WEAPON LOSS.
C     ______________________________________________________________________
C
C    ******* CHECK OUT THE PROPER SUBCRIPT FOR 6024 & 6021  ************
```

```
C
C
          IF (L .NE. ISATT) THEN
            DO 6024 IW = 1,N3
              WLS(IW,IS,L) = 0.0
              DGRD(IW) = 0.0
              DO 6021 KW = 1,N4
                GKGS(KW,IW,II) = WSI(KW,IS,II) * PWAKW(KW,IW,II) *
     &                           SFGND(KPCAS,2,L)
                DGRD(IW) = DGRD(IW) + GKGS(KW,IW,II)
 6021         CONTINUE
              DAIR(IW) = 0.0
              DO 6022 IAC = 1,N5
                AKGS(IAC,IW,II) = ACSABA(IAC,IS,II) * PAAKW(IAC,IW,II)
     &                            * SFCAS(KPCAS,2,L)
                DAIR(IW) = DAIR(IW) + AKGS(IAC,IW,II)
 6022         CONTINUE
              DSSM(IW) = 0.0
              DO 6023 ISSM = 1,N6
                XMKGS(ISSM,IW,II) = SSMALO(ISSM,IS,II) *
     &                         PMAKW(ISSM,IW,II) * SFSSM(KPCAS,2,L)
                DSSM(IW) = DSSM(IW) + XMKGS(ISSM,IW,II)
 6023         CONTINUE
              WLS(IW,IS,L) = DGRD(IW) + DAIR(IW) + DSSM(IW)
 6024       CONTINUE
          ELSE     !  L IS SECTOR ATTACKER
            DO 6049 IW = 1,N3
              WLS(IW,IS,L) = 0.0
              DGRD(IW) = 0.0
              DO 6046 KW = 1,N4
                GKGS(KW,IW,II) = WSI(KW,IS,II) * PWDKW(KW,IW,II) *
     &                  SFGND(KPCAS,1,L)
                DGRD(IW) = DGRD(IW) + GKGS(KW,IW,II)
 6046         CONTINUE
              DAIR(IW) = 0.0
              DO 6047 IAC = 1,N5
                AKGS(IAC,IW,II) = ACSABA(IAC,IS,II) * PADKW(IAC,IW,II) *
     &                    SFCAS(KPCAS,1,L)
                DAIR(IW) = DAIR(IW) + AKGS(IAC,IW,II)
 6047         CONTINUE
              DSSM(IW) = 0.
              DO 6048 ISSM = 1,N6
                XMKGS(ISSM,IW,II) = SSMALO(ISSM,IS,II) *
     &                       PMDKW(ISSM,IW,II) * SFSSM(KPCAS,1,L)
                DSSM(IW) = DSSM(IW) + XMKGS(ISSM,IW,II)
 6048         CONTINUE
              WLS(IW,IS,L) = DGRD(IW) + DAIR(IW) + DSSM(IW)
 6049       CONTINUE
          ENDIF
C ----------------------------------------------------------------
C
C         ADJUST GKGS, AKGS, AND XMKGS
C
          DO 6085 IW=1,N3
            IF (WLS(IW,IS,L) .LE. WS(IW,L)) THEN
              IF (DGRD(IW) .GT. WSI(IW,IS,L)) THEN
                FRAC = WSI(IW,IS,L)/DGRD(IW)
```

```
                 DO 6076 KW=1,N4
                   GKGS(KW,IW,II) = GKGS(KW,IW,II)*FRAC
 6076            CONTINUE
                 DGRD(IW) = DGRD(IW)*FRAC
               ENDIF
             ELSE    ! WLS > WS
               FRAC = WSI(IW,IS,L)/WLS(IW,IS,L)
               DO 6077 KW=1,N4
                 GKGS(KW,IW,II) = GKGS(KW,IW,II)*FRAC
 6077          CONTINUE
               DGRD(IW) = DGRD(IW)*FRAC
               FRAC = WS(IW,L)/WLS(IW,IS,L)
               DO 6078 IAC=1,N5
                 AKGS(IAC,IW,II) = AKGS(IAC,IW,II)*FRAC
 6078          CONTINUE
               DAIR(IW) = DAIR(IW)*FRAC
               DO 6079 ISSM=1,N6
                 XMKGS(ISSM,IW,II) = XMKGS(ISSM,IW,II)*FRAC
 6079          CONTINUE
               DSSM(IW) = DSSM(IW)*FRAC
             ENDIF
             WLS(IW,IS,L) = DGRD(IW) + DAIR(IW) + DSSM(IW)
 6085      CONTINUE
         ENDIF
C
C       --- Use ADJUST to adjust the munition expenditures.
C
         CALL ADJUST(EXNPMN(1,1,II),(LNW*LNW),VFACTOR)
         CALL ADJUST(TEXNPM(1,IS,II),(LNW),VFACTOR)
         CALL ADJUST(EXPMN(1,1,1,IS,II),(LNW*LNW*LNSMN),VFACTOR)
         CALL ADJUST(SMENG(1,1,IS,II),(LNW*LNSMN),VFACTOR)
        DO JW = 1,N4
         DO ISM = 1,NSM(II)
         TSMSTK  = SMSTK(ISM,IS,II) - SMENG(JW,ISM,IS,II) *
     &                         WSI(JW,IS,II)
         SMSTK(ISM,IS,II) = MAX(0.0, TSMSTK)
         ENDDO
        ENDDO
C
        IF (KPSMGA(15) .EQ. 1 .AND. ISMUS(II) .EQ. 1) THEN
         DO 636 ISM =1,NSM(II)
         WRITE (MOT,630)ISM, II, ICYCLE
 630     FORMAT (/,' MUNITIONS TYPE',I4,' FIRED ON TARGETS BY SIDE',I4,
     &             ' CYCLE',I4)
         WRITE(MOT,6331) ((AWT(IW,IWORD,L),IWORD=1,2),IW=1,N3)
 6331    FORMAT(1X,<N3>(2A4))
         DO 631 JW = 1,N4
 631     WRITE (MOT,632)(EXPMN(JW,IW,ISM,IS,II),IW = 1,N3)
 632     FORMAT (1X,16F8.3)
         WRITE (MOT,633) ISM,II,ICYCLE
 633     FORMAT (/,' MUNITIONS TYPE',I4,' ON ALL TARGETS BY SIDE',I4,
     &             ' CYCLE',I4)
         DO 634 JW = 1,N4
 634     WRITE (MOT,635)(AWT(JW,IWORD,II),IWORD=1,2),SMENG(JW,ISM,IS,II)
 635     FORMAT (1X,2A4,1X,10F8.3)
 636     CONTINUE
        ENDIF
```

```
C  CALCULATE TOTAL MUNITION SPENT BY SINGLE WEAPON TYPE FOR ALL SECTORS
C
          DO ISM=1,NSM(II)
            DO JW=1,N4
               CSMENG(ISM,IS,II)=CSMENG(ISM,IS,II)+
     1                     (SMENG(JW,ISM,IS,II)*WSI(JW,IS,II))
            END DO
          END DO
C
C  ---------------------------------------------------------------
C  FOR DETAILED
C  ---------------------------------------------------------------
C
        IF (IPRB .EQ. 1) THEN
          IF (L .EQ. ISATT) THEN
            WRITE(MOT,6070) L
 6070 FORMAT(/,' WEAPON LOSSES FOR ATTACKER --- SIDE ',I2)
          ELSE
            WRITE(MOT,6073) L
 6073 FORMAT(/,' WEAPON LOSSES FOR DEFENDER --- SIDE ',I2)
          ENDIF
          CALL DEBUG(MOT,'DAIR  ',DAIR,LNW,1,1)
          CALL DEBUG(MOT,'DGRD  ',DGRD,LNW,1,1)
          CALL DEBUG(MOT,'DSSM  ',DSSM,LNW,1,1)
        ENDIF
        DO 6056 IW = 1,N3
          DO 6053 KW = 1,N4
            SGKGS(KW,IW,IS,II) = SGKGS(KW,IW,IS,II) + GKGS(KW,IW,II)
 6053     CONTINUE
          DO 6054 IAC = 1,N5
            SAKGS(IAC,IW,IS,II) = SAKGS(IAC,IW,IS,II) + AKGS(IAC,IW,II)
 6054     CONTINUE
          DO 6055 ISSM = 1,N6
            SMKGS(ISSM,IW,IS,II) = SMKGS(ISSM,IW,IS,II) +
     &                             XMKGS(ISSM,IW,II)
 6055     CONTINUE
 6056   CONTINUE
C
C  ---------------------------------------------------------------
C  COMPUTE PERSONNEL LOSSES USING THE WEAPON LOSSES AND THE FACTOR
C  FTCWPL
C  ---------------------------------------------------------------
C
C*********************************************************************
C CIRCUMVENT THE FOLLOWING CODE TO ALLOW FOR THE PERSONNEL CASUALTIES TO BE
C CALCULATED USING WEAPONS AND FTCWPL (FACTOR TO COMPUTE PERSONNEL CASUALTIES
C FROM WEAPON LOSSES SUFFERED IF THE CURVE SWITCH IS OFF)
C*********************************************************************
C
C 55) CALCULATE CASUALTIES TO BOTH SIDES AND SUBTRACT OUT LOSSES
C
      IF( IPLSC .EQ. 0 )THEN
          IF (L .EQ. 1) THEN
            N1 =1
            N2 = NDS(IS,1)
          ELSE  ! L = 2
```

```
              N1 = NDS(IS,1) + 1
              N2 = NDS(IS,1) + NDS(IS,2)
            ENDIF
            PLS(IS,L) = 0.
            IF (NDS(IS,L) .GT. 0) THEN
              DO IDS = N1,N2
                ID = IDLABA(IDS,IS)
C
C MAKE SURE NO HIGHER ECHELON UNITS ARE PROCESSED
C
                IF (ITD(ID) .NE. -1) THEN
                  DIST = ABS(FEBA(IS) - CDVLOC(ID))
                  FRACW = (DFBACT(L) - DIST)/DFBACT(L)
                  TEMP = PCS(L) * (PDIV(ID) * FRACW)
                  TPDIV(L) = TPDIV(L) + PDIV(ID)
C
C     SPECIAL CAS EFFECT ADJUSTMENT
C
                  TEMPG = 0.
                  TEMPA = 0.
                  TEMPM = 0.
                  IF (II  .NE.  ISA(IS)) THEN     ! DEFENDER INFLICTING LOSSES
                    TEMP1 = VGDBAI(IS,II) + VADBA(IS,II) + VMDBA(IS,II)  ! TOTAL KILLS
                    IF (TEMP1 .GT. .0001) THEN
                      TEMPG = TEMP * VGDBAI(IS,II) / TEMP1  ! KILLS BY GROUND
                      TEMPA = TEMP * VADBA(IS,II) / TEMP1   ! KILLS BY AIR
                      TEMPM = TEMP * VMDBA(IS,II) / TEMP1   ! KILLS BY SSM'S
                    ENDIF
                  ELSE  ! ATTACKER INFLICTING LOSSES
                    TEMP1 = VGABAI(IS,II) + VAABA(IS,II) + VMABA(IS,II)
                    IF (TEMP1 .GT. .0001) THEN
                      TEMPG = TEMP * (VGABAI(IS,II) / TEMP1)
                      TEMPA = TEMP * (VAABA(IS,II) / TEMP1)
                      TEMPM = TEMP * (VMABA(IS,II) / TEMP1)
                    ENDIF
                  ENDIF
                  TEMPA = TEMPA * FICAS(1,II)
                  SCASUAL(1,IS,L) = SCASUAL(1,IS,L) + TEMPG
                  SCASUAL(2,IS,L) = SCASUAL(2,IS,L) + TEMPA
                  SCASUAL(3,IS,L) = SCASUAL(3,IS,L) + TEMPM
                  TEMP = TEMPG + TEMPA + TEMPM  !CAS ADJUSTED KILLS
                  TEMP = AMIN1(TEMP,(PDIV(ID)*FRACW))
                  PDIV(ID) = PDIV(ID) - TEMP
                  PLS(IS,L) = PLS(IS,L) + TEMP
                  PLST(L) = PLST(L) + PLS(IS,L)
                  IC = ICBIT(ID)
                  CPLS(IS,IC) = CPLS(IS,IC) + TEMP
                  PIARP(IC) = PIARP(IC) + FPCR(IC) * TEMP
                ENDIF
              ENDDO
            ENDIF
C ------------------------------------------------------------------
C COMPUTE TOTAL PERSONNEL LOSSES FROM WEAPON LOSSES
C ------------------------------------------------------------------
        ELSE
            PLSG = 0.
            PLSA = 0.
```

```
            PLSM = 0.
            DO IW = 1,N3
              PLSG = DGPD(IW) * FTCWPL(IW,L) + PLSG
              PLSA = DAIR(IW) * FTCWPL(IW,L) + PLSA
              PLSM = DSSM(IW) * FTCWPL(IW,L) + PLSM
            ENDDO
C
            SCASUAL(1,IS,L) = SCASUAL(1,IS,L) + PLSG
            SCASUAL(2,IS,L) = SCASUAL(2,IS,L) + PLSA
            SCASUAL(3,IS,L) = SCASUAL(3,IS,L) + PLSM
C
         ENDIF
 6060 CONTINUE
C ------------------------------------------------------------------
C 65) COMPUTE WEAPONS LOST BY TYPE FOR EACH DIVISION.
C ------------------------------------------------------------------
        N2 = 0
        DO 6520 L = 1,2
          IF (NDS(IS,L) .GT. 0) THEN
            N1 = 1 + N2
            N2 = N2 + NDS(IS,L)
            N3 = NW(L)
            DO 6510 IDS = N1,N2
              ID = IDLABA(IDS,IS)
C
C   MAKE SURE NO HIGHER ECHELON UNITS ARE PROCESSED
C
              IF (ITD(ID) .EQ. -1) GOTO 6510
              IC = ICBIT(ID)
              DIST = ABS(FEBA(IS) - CDVLOC(ID))
              FRACW = (DFBACT(L) - DIST)/DFBACT(L)
              DO 6505 IW = 1,N3
                IF (WS(IW,L) .GT. 0.0) THEN
                  IF (ERGMAX(IW,L) .EQ. 0.) THEN
                    WPSOH = WDIV(IW,ID) * FRACW
                  ELSE IF (DIST .LE. ERGMAX(IW,L)) THEN
                    WPSOH = WDIV(IW,ID)
                  ELSE
                    WPSOH = 0.
                  ENDIF
                  TEMP = WLS(IW,IS,L) * (WPSOH / WS(IW,L))
                  TEMP1 = AMIN1(TEMP,WPSOH)
                  IF (TEMP1 .LE. .00001) TEMP1 = 0.
C
C COMPUTE PERSONNEL LOST TO THE UNIT BASED ON THE WEAPONS LOST
C IF IPLSC FLAG IS SET.
C
                  IF (IPLSC .NE. 0) THEN
                     TEMPP = TEMP1 * FTCWPL(IW,L)
                     PDIV(ID) = PDIV(ID) - TEMPP
                     CPLS(IS,IC) = CPLS(IS,IC) + TEMPP
                     PLS(IS,L) = PLS(IS,L) + TEMPP
                     PIARP(IC) = PIARP(IC) + FPCR(IC) * TEMPP
                  ENDIF
C
                  WDIV(IW,ID) = WDIV(IW,ID) - TEMP1
                  IF (WDIV(IW,ID) .LT. 0.0001) WDIV(IW,ID) = 0.0
```

```
                 CWLS(IW,IS,IC) = CWLS(IW,IS,IC) + TEMP1
               ENDIF
 6505        CONTINUE
 6510      CONTINUE
         ENDIF
 6520 CONTINUE
         IF (IPRB .EQ. 1) THEN
           WRITE(MOT,123)
           WRITE(MOT,22) (PLS(IS,L),L = 1,2)
           WRITE(MOT,127)
           WRITE(MOT,22) (CPLS(IS,IC),IC = 1,NIC)
         ENDIF
C-----------------------------------------------------------
C  TOTAL EQUIP OF THIS TYPE LOST THIS CYCLE
C-----------------------------------------------------------
         DO L = 1,2
           N3 = NW(L)
           DO IW = 1,N3
             WLST(IW,L) = WLST(IW,L) + WLS(IW,IS,L)
           ENDDO
         ENDDO
C
         IF (IPRB .EQ. 1) THEN
           DO 6580 L=1,2
             N3 = NW(L)
             WRITE(MOT,121) L
             WRITE(MOT,22) (WLS(IW,IS,L),IW = 1,N3)
             N1 = 1
             N2 = NICL - 1
             IF(L .EQ. 1) GOTO 6565
             N1 = NICL
             N2 = NIC
 6565        CONTINUE
             DO 6575 IC = N1,N2
               WRITE(MOT,122) IC
               WRITE(MOT,22) (CWLS(IW,IS,IC),IW = 1,N3)
 6575        CONTINUE
 6580      CONTINUE
           DO 6585 L = 1,2
             II = 3-L
             N3 = NW(L)
             N4 = NW(II)
             N5 = NAC(II)
             WRITE(MOT,124) II,L
             DO 6581 KW = 1,N4
               WRITE(MOT,22) (GKGS(KW,IW,II),IW = 1,N3)
 6581        CONTINUE
             WRITE(MOT,125) II,L
             DO 6582 IAC = 1,N5
               WRITE(MOT,22) (AKGS(IAC,IW,II),IW = 1,N3)
 6582        CONTINUE
 6585      CONTINUE
           CALL DEBUG(MOT,'XMKGS ',XMKGS,LNSSM,LNW,2)
         ENDIF
C
C    -----------------------------------------------------------------
C 70) COMPUTE TONS OF SUPPLY LOST.
```

```
C      ------------------------------------------------------------------
C        IF (ISEFFD .NE. 3) THEN
       N2 = 0
       DO 7025 L = 1,2
         N1 = N2 + 1
         N2 = N2 + NDS(IS,L)
         IF (NDS(IS,L).GT.0) THEN
           K = 3 - L
           N3 = NW(K)
           N4 = NAC(K)
           N5 = NSSM(K)
           DO 7024 ISPT = 1,NSPT
             TT1 = 0.0
             TSL(IS,ISPT,L) = 0.
             DO 7005 IW = 1,N3  !SUPPLIES DESTROYED BY GROUND WEAPONS
               TSL(IS,ISPT,L) = TSL(IS,ISPT,L) + SLWCB(IW,ISPT,K) *
     &                 WSI(IW,IS,K)
 7005        CONTINUE
             TT1 = TSL(IS,ISPT,L)
             TEMP1 = 0.0
             TEMP2 = 0.0
             DO 7010 IAC = 1,N4    !SUPPLIES DESTROYED BY CAS AIRCRAFT
               TEMP1 = TEMP1 + SLSCAS(IAC,ISPT,K) * ACSABA(IAC,IS,K)
 7010        CONTINUE
             DO 7012 ISSM = 1,N5
               TEMP2 = TEMP2 + SLSSSM(ISSM,ISPT,K) * SSMALO(ISSM,IS,K)
 7012        CONTINUE
             TSL(IS,ISPT,L) = TSL(IS,ISPT,L) + TEMP1 + TEMP2
             TSS = 0.
             DO 7015 IDS = N1,N2
               ID = IDLABA(IDS,IS)
               TSS = TSS + SDIV(ID,ISPT)
 7015        CONTINUE
             IF (TSS.GT.0.) THEN
               DO 7020 IDS = N1,N2
                 ID = IDLABA(IDS,IS)
                 RRR = SDIV(ID,ISPT) / TSS
                 TEMP = TSL(IS,ISPT,L) * RRR
                 TEMPA = AMIN1(TEMP,SDIV(ID,ISPT))
                 SDIV(ID,ISPT) = SDIV(ID,ISPT) - TEMPA
                 IC = ICBIT(ID)
                 FRAC = 1.0
                 IF (TEMP .GT. 0.) FRAC = TEMPA / TEMP
                 CSDGW(ISPT,IC) = CSDGW(ISPT,IC) + (RRR * FRAC * TT1)
                 CSDAW(1,ISPT,L) = CSDAW(1,ISPT,L) + (RRR*FRAC*TEMP1)
                 CSDSW(1,ISPT,L) = CSDSW(1,ISPT,L) + (RRR*FRAC*TEMP2)
 7020          CONTINUE
             ENDIF
 7024      CONTINUE
         ENDIF
 7025  CONTINUE
       IF (IPRB .EQ. 1) THEN
         WRITE(MOT,129)
         WRITE(MOT,22) ((TSL(IS,ISPT,L),L = 1,2),ISPT = 1,NSPT)
         N2 = 0
         DO 7080 L = 1,2
           IF (NDS(IS,L) .GT. 0) THEN
```

```
                N3 = NW(L)
                WRITE(MOT,126) L
                DO 7079 IDS = N1,N2
                  ID = IDLABA(IDS,IS)
C
C  MAKE SURE HIGHER ECHELON UNITS ARE NOT PROCESSED
C
                  IF (IT .EQ. -1) GOTO 7079
                  WRITE(MOT,21),ID,PDIV(ID),(WDIV(IW,ID),IW = 1,N3),
     &                                  (SDIV(ID,ISPT),ISPT=1,NSPT)
 7079           CONTINUE
               ENDIF
 7080      CONTINUE
           ENDIF
C            ENDIF
C
C  ----------------------------------------------------------------
C 75) COMPUTE NUMBER OF WEAPONS REPAIRABLE AFTER GROUND COMBAT
C  ----------------------------------------------------------------
C
        N2 = 0
        DO 7520 L = 1,2
          IF (NDS(IS,L).GT.0) THEN
            N1 = 1 + N2
            N2 = N2 + NDS(IS,L)
            N3 = NW(L)
            I = 0
            IF (ISATT.EQ.L) I = 1
            IF (I.EQ.0) THEN
              IF (KP.EQ.2.OR.KP.EQ.3.OR.KP.EQ.4) I = 2
              IF (KP.EQ.1.OR.KP.EQ.5) I = 3
              IF (KP.EQ. 6) I = 4
            ENDIF
            DO 7515 IDS = N1,N2
              ID = IDLABA(IDS,IS)
C
C  MAKE SURE NO HIGHER ECHELON UNITS ARE PROCESSED
C
                IF (ITD(ID) .EQ. -1) GOTO 7515
                IC = ICBIT(ID)
                DIST  = ABS(FEBA(IS) - CDVLOC(ID))
                FRACW = (DFBACT(L) - DIST)/DFBACT(L)
                DO 7510 IW = 1,N3
                  IF (WS(IW,L).GT.0.) THEN
                    IF (ERGMAX(IW,L) .EQ. 0.) THEN
                      WPSOH = WDIV(IW,ID) * FRACW
                    ELSE IF (DIST .LE. ERGMAX(IW,L)) THEN
                      WPSOH = WDIV(IW,ID)
                    ELSE
                      WPSOH = 0.
                    ENDIF
                    TEMP = WLS(IW,IS,L) * (WPSOH / WS(IW,L))
                    TEMP1 = (1. - PWATS(IW,I,L))*TEMP
C  ALLOCATE TO APPROPRIATE REPAIR POOLS
                    WDRRPC(IW,IS,IC) = WDRRPC(IW,IS,IC) +
     &                               TEMP1 * PWDRP(2,IW,L)
                    WDRRP(IW,IC) = WDRRP(IW,IC) + TEMP*PWDRP(3,IW,L)
```

```
C  WEAPONS REPAIRED AT DIVISION LEVEL ARE RETURNED TO THE DIVISION IMMEDIATELY
                  WDIV(IW,ID) = WDIV(IW,ID) + TEMP1 * PWDRP(1,IW,L)
C
C  ADD WEAPONS REPAIRED AT THE DIVISION TO CUMMULATIVE REPAIRED WEAPONS
C  RETURNED TO DIVISION
                  REPWPN(IW,IS,IC) = REPWPN(IW,IS,IC) +
     &              TEMP1 * PWDRP(1,IW,L)
                ENDIF
 7510         CONTINUE
 7515       CONTINUE
          ENDIF
 7520 CONTINUE
C
        IF (IPRB .EQ. 1) THEN
          WRITE(MOT,130)
          DO 7580 IC = 1,NIC
            L = 1
            IF (IC .GE. NICL)L = 2
            N3 = NW(L)
            WRITE(MOT,22)(WDRRP(IW,IC),IW = 1,N3)
 7580     CONTINUE
        ENDIF
C ---------------------------------------------------------------------
C 80) CALCULATE CASUALTIES AND WEAPON LOSSES INFLICTED BY AIR, PER
C     SORTIE.
C ---------------------------------------------------------------------
        DO 8030 L=1,2
        K = 3 - L
        TEMP = 0.
        IF (ISATT.EQ.K) THEN
          TEMP1 = VAABA(IS,K) + VGABAI(IS,K) + VMABA(IS,K)
          IF (TEMP1 .GT. .0001) TEMP = VAABA(IS,K) / TEMP1
        ELSE
          TEMP1 = VADBA(IS,K) + VGDBAI(IS,K) + VMDBA(IS,K)
          IF (TEMP1 .GT. .0001) TEMP = VADBA(IS,K) / TEMP1
        ENDIF
        CDACS(IS,L) = PLS(IS,L) * TEMP
        NX = NW(L)
        DO 8015 IW = 1,NX
          WLDAS(IW,IS,L) = WLS(IW,IS,L) * TEMP
 8015 CONTINUE
        N9 = NAC(K)
        SUM = 0.
        DO 8020 IAC = 1,N9
          SUM = SUM + ACSABA(IAC,IS,K)
 8020 CONTINUE
        IF (SUM.GT..001) THEN
          CDACS(IS,L) = CDACS(IS,L) / SUM
          DO 8025 IW = 1,NX
            WLDAS(IW,IS,L) = WLDAS(IW,IS,L) / SUM
 8025     CONTINUE
        ENDIF
 8030 CONTINUE
C
 9999 CONTINUE
        DO 8099 L = 1,2
          IF (SFAPP(L) .EQ. 0.0) THEN
```

```
            SFAPP(L) = SFAPPT(L)
            GOTO 8099
          ENDIF
          SFAPP(L) = SFAPP(L)/NUMINC(L)
 8099 CONTINUE
C
        IF (IPRB .EQ. 1) CALL DEBUG(MOT,'SFAPP ',SFAPP,2,1,1)
C -----------------------------------------------------------------
C  OUTPUT CONTRIBUTIONS TO DIVISION EFFECTVINESS
C -----------------------------------------------------------------
C
        IF (KPSMGA(2) .EQ. 1) THEN
          WRITE(MOT,8110)ICYCLE
 8110     FORMAT(1H1,//,1X,'TABLE 5.2  CYCLE',I4,/,
     & ' DIVISION EFFECTIVENESS -- FRACTIONS BASED ON BASE -- ',
     & 'EFFECTIVENESS FROM TABLES'
     & ,/,1X,120(1H-),//)
          WRITE(MOT,8115)
 8115     FORMAT(1H0,4H DIV,4H DIV,  7H*  FRAC,7H EFF AT ,7H EFF DF  ,
     & 7H*FRC AT , 7H EFF AT, 7H FRC DF, 7H EFF DF , 7H*  FRAC,
     & 7H EFF AT ,           7H*    EFF,7H*    EFF,7H    EFF,10H**    VALUE
     &,10H      VALUE ,/,    1X,4H   ID,4HTYPE,7H*PEOPLE,7H PEOPLE,
     & 7H PEOPLE, 7H*   WPNS,7H    WPNS,7H    WPNS,7H    WPNS,
     & 7H*SUPPLY,7H SUPPLY,            7H*  CHEM,7H*ATTACK,7HDEFENSE,
     & 10H**  ATTACK, 10H   DEFENSE ,//)
          DO 8120 IDI = 1,LND
            ID = IDENTR(IDI)
            IF (ITD(ID) .EQ. -1) GOTO 8120
            IF(ID .NE. 0) THEN
              WRITE(MOT,8130) ID,ITD(ID),PPSAR(ID),PEAAR(ID),PEDAR(ID),
     &                        WATSAR(ID),WEAAR(ID),WDTSAR(ID),WEDAR(ID),
     &                        DSHAR(ID),SEFAR(ID),FDEFCP(ID),EFFDA(ID),
     &                        EFFDD(ID),VDAC(ID),VDDC(ID)
 8130         FORMAT(1H ,2I4,12F7.3,2F10.2)
            ENDIF
 8120     CONTINUE
        ENDIF
C ---------
C     NOW WRITE SECTOR VALUES
C ---------
        IF (KPSMGA(1) .EQ. 1) THEN
          WRITE(MOT,8201)ICYCLE,(IS,IS = 1,NS)
 8201     FORMAT(1H1,' TABLE 5.1  CYCLE',I4,/,21X,80(1H.),/,
     & 21X,'GROUND CAPABILITES AND FORCE RATION BY SECTOR',/,
     & 1X,20X,6HSECTOR,14X,8I10,/)
          WRITE(MOT,8205)(ISA(IS),IS = 1,NS)
 8205     FORMAT(1H0,21HSECTOR ATTACKER -ISA- ,  19X,8I10)
          DO 8210 L = 1,2
            WRITE(MOT,8211)ASIDE(L),(IS,IS = 1,NS)
 8211       FORMAT(1H0,21X,17HCAPABILITIES FOR ,A4,//,
     & 1X,20X,6HSECTOR,14X,8I10,/)
            WRITE(MOT,8221)(VGABA(IS,L),IS = 1,NS)
 8221       FORMAT(1H0,32HGROUND VALUES FOR ATTACK -VGABA-, 8X,8F10.2)
            WRITE(MOT,8222)(VGDBA(IS,L),IS = 1,NS)
 8222       FORMAT(1H , 33HGROUND VALUES FOR DEFENSE -VGDBA- ,7X,8F10.2)
            WRITE(MOT,8223)(VAABA(IS,L),IS = 1,NS)
 8223       FORMAT(1H0, 29HAIR VALUES FOR ATTACK -VAABA-,11X,8F10.2)
```

```
               WRITE(MOT,8224)(VADBA(IS,L),IS = 1,NS)
      8224     FORMAT(1H , 30HAIR VALUES FOR DEFENSE -VADBA-,10X,8F10.2)
               WRITE(MOT,8212)(VMABA(IS,L),IS=1,NS)
      8212     FORMAT(/,' SSM VALUES FOR ATTACK -VMABA-',11X,8F10.2)
               WRITE(MOT,8213)(VMDBA(IS,L),IS=1,NS)
      8213     FORMAT(1H ,'SSM VALUES FOR DEFENSE -VMDBA-',10X,8F10.2)
               WRITE(MOT,8225)(PPESAR(IS,L),IS = 1,NS)
      8225     FORMAT(1H0, 35HSECTOR SUPPLY EFFECTIVENESS -PPESE-,5X,8F10.4)
               WRITE(MOT,8226)(FRCAR(IS,L),IS = 1,NS)
      8226     FORMAT(1H0, 20HVALUE RATIO -FRCA/D-,20X,8F10.4)
               WRITE(MOT,8227) (PCSAR(IS,L),IS = 1,NS)
      8227     FORMAT(1H0, 30HVALUE LOST FOR PERSONELL -PCS- ,10X,8F10.4)
               WRITE(MOT,8228) (VLSAR(IS,L),IS = 1,NS)
      8228     FORMAT(1H , 28HVALUE LOST FOR WEAPONS -VLS- ,12X,8F10.4)
      8210   CONTINUE
           ENDIF
C
C 85) AVERAGE CASUALTIES AND WEAPON LOSSES PER SORTIE OVER REGIONS.
C
           M2 = 0
           DO 8550 L = 1,2
             NX = NW(L)
             M1 = M2 + 1
             M2 = M2 + NR(L)
             DO 8530 IR = M1,M2
               FPDCAS(IR) = 0.
               DO 8510 IW = 1,NX
                 FWDCAS(IW,IR) = 0.
 8510          CONTINUE
               IS1 = NLSR(IR)
               IS2 = NHSR(IR)
               DO 8520 IS = IS1,IS2
                 FPDCAS(IR) = FPDCAS(IR) + CDACS(IS,L)
                 DO 8515 IW = 1,NX
                   FWDCAS(IW,IR) = FWDCAS(IW,IR) + WLDAS(IW,IS,L)
 8515            CONTINUE
 8520          CONTINUE
               TOT = IS2 - IS1 + 1
               FPDCAS(IR) = FPDCAS(IR) / TOT
               DO 8525 IW = 1,NX
                 FWDCAS(IW,IR) = FWDCAS(IW,IR) / TOT
 8525          CONTINUE
 8530        CONTINUE
 8550      CONTINUE
C
C+-----------------------------------------------------------+
C+                                                           +
C+ COMPUTE CUMULATIVE AIRMUNITIONS EXPENDED ON CAS.          +
C+        FOR TABLE 1.18                                     +
C+-----------------------------------------------------------+
         DO L = 1,2
           IMT = 2 + 6 * (L - 1)
           DO IS = 1,NS
             DO IAM = 1,NAM(L)
               DO IAC = 1,NAC(L)
                 CAMCAS(IAC,IAM,IS,L) = CAMCAS(IAC,IAM,IS,L) +
     &             (ACSABA(IAC,IS,L) * AMNL(IAC,IAM,IMT))
```

```
C
C              DECREMENT AIRMUNITIONS REMAINING
C
               AMTIAM(IAM,L) = AMTIAM(IAM,L) - (ACSABA(IAC,IS,L) *
     1                         AMNL(IAC,IAM,IMT))
             ENDDO
           ENDDO
         ENDDO
       ENDDO
C
       IPRB = IPRBST
C
       RETURN
C
 10    FORMAT(1X,10I10)
 21    FORMAT(1X,I5,14F8.1)
 22    FORMAT(1X,16F8.3)
100    FORMAT(/,' ADJUSTED ALLOCATION (ATTACK)  — SIDE',
      & I3,' AGAINST SIDE',I3)
 101   FORMAT(/,' ADJUSTED ALLOCATION (DEFENSE) — SIDE',
      & I3,' AGAINST SIDE',I3)
 102   FORMAT(/,' ADJUSTED POTENTIAL  (ATTACK)  — SIDE',
      & I3,' AGAINST SIDE',I3)
 103   FORMAT(/,' ADJUSTED POTENTIAL  (DEFENSE) — SIDE',
      & I3,' AGAINST SIDE',I3)
 104   FORMAT(1H0,20H** GROUND WEAPONS **)
 105   FORMAT(1H0,17H** AIR WEAPONS **)
 106   FORMAT(1H0,28HWEAPON ATTACK VALUES — SIDE,I3)
 107   FORMAT(1H0,29HWEAPON DEFENSE VALUES — SIDE,I3)
 108   FORMAT(1H0,25HAIR ATTACK VALUES — SIDE,I3)
 109   FORMAT(1H0,26HAIR DEFENSE VALUES — SIDE,I3)
 110   FORMAT(1H0,24HDIVISION NUMBER     TYPE)
 111   FORMAT('0','WVDAC(ID) WVDDC(ID) WVDACI WVDDCI WVDAT(ID) '
      &        'WVDDT(ID) EDAXSR(ID) EDDXSR(ID) EFFDA(ID) EFFDD(ID) '
      &        'VDAC(ID) VDDC(ID)')
 112   FORMAT(1H0,7X,3HPEA,7X,3HPED,7X,3HDSH,7X,3HSEF)
 113   FORMAT(1H0,38HVGABA(1)  VGDBA(1)  VGABA(2)  VGDBA(2))
 114   FORMAT(1H0,38HVAABA(1)  VADBA(1)  VAABA(2)  VADBA(2))
 115   FORMAT(1H0,2X,8HFRAD(IS))
 116   FORMAT(1H0,5X,5HPPESE,7X,3HDSH)
 117   FORMAT(1H0,6X,4HFRCA,6X,4HFRCD,6X,4HPCFR)
 118   FORMAT(1H0,3X,6HVLS(1),3X,6HVLS(2),3X,6HPCS(1),3X,6HPCS(2))
 119   FORMAT(1H0,2X,9HPWLSA(IW,,I1,1H))
 120   FORMAT(1H0,2X,9HPWLSD(IW,,I1,1H))
 121   FORMAT(1H0,2X,31HWEAPONS LOST IN SECTOR FOR SIDE,I3)
 122   FORMAT(1H0,2X,'CUMULATIVE WEAPONS LOST IN SECTOR FOR COUNTRY',I3)
 123   FORMAT(1H0,37HCASUALTIES IN SECTOR FOR BLUE AND RED)
 124   FORMAT(1H0,2X,4HSIDE,I3,2X,17HGROUND KILLS SIDE,I3,2X,6HGROUND)
 125   FORMAT(1H0,2X,4HSIDE,I3,2X,14HAIR KILLS SIDE,I3,2X,6HGROUND)
 126   FORMAT(1H0,2X,'DIVISION NO. PEOPLE IN DIV., WEAPONS IN DIV., ',
      &'SUPPLIES IN DIV. FOR SIDE ',I3)
 127   FORMAT(1H0,2X,48HCUMULATIVE CASUALTIES IN SECTOR FOR BLUE AND RED)
 128   FORMAT(1H0,4X,6HTSC(1),4X,6HTSC(2))
 129   FORMAT(1H0,1X,9HTSL(IS,1),1X,9HTSL(IS,2))
 130   FORMAT(/,' WDRRP(IW,IC)')
 131   FORMAT(22H0IHOLD(L),IWDRAW(IS,L))
 132   FORMAT(1H0,2X,7HISA(IS))
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 135  FORMAT(1H0,38HVMABA(1)  VMDBA(1)  VMABA(2)  VMDBA(2))
 140  FORMAT(/,' ADJUSTED ALLOCATION FOR MISSILE (ATTACK)  — SIDE',
     & I3,' AGAINST SIDE',I3)
 141  FORMAT(/,' ADJUSTED ALLOCATION FOR MISSILE (DEFENSE) — SIDE',
     & I3,' AGAINST SIDE',I3)
 142  FORMAT(/,' ADJUSTED POTENTIAL  FOR MISSILE (ATTACK)  — SIDE',
     & I3,' AGAINST SIDE',I3)
 143  FORMAT(/,' ADJUSTED POTENTIAL  FOR MISSILE (DEFENSE) — SIDE',
     & I3,' AGAINST SIDE',I3)
 144  FORMAT(1H0,' MISSILE ATTACK VALUES  — SIDE',I3)
 145  FORMAT(1H0,' MISSILE DEFENSE VALUES — SIDE',I3)
      END
```

PROGRAM SECTIONS

Name	Bytes	Attributes
0 $CODE	50428	PIC CON REL LCL SHR EXE RD NOWRT LONG
1 $PDATA	4842	PIC CON REL LCL SHR NOEXE RD NOWRT LONG
2 $LOCAL	845592	PIC CON REL LCL NOSHR NOEXE RD WRT LONG
3 AGCOM	76852	PIC OVR REL GBL SHR NOEXE RD WRT LONG
4 AGWK	266320	PIC OVR REL GBL SHR NOEXE RD WRT LONG
5 BLANK	324752	PIC OVR REL GBL SHR NOEXE RD WRT LONG
6 BLANKRS	262416	PIC OVR REL GBL SHR NOEXE RD WRT LONG
7 BLANKSV	6668	PIC OVR REL GBL SHR NOEXE RD WRT LONG
8 BLANKW	80208	PIC OVR REL GBL SHR NOEXE RD WRT LONG
9 COMMCH	39979	PIC OVR REL GBL SHR NOEXE RD WRT LONG
10 GCFM	157980	PIC OVR REL GBL SHR NOEXE RD WRT LONG
11 GCHIM	3688	PIC OVR REL GBL SHR NOEXE RD WRT LONG
12 GCRS	219848	PIC OVR REL GBL SHR NOEXE RD WRT LONG
13 GRDCOM	470076	PIC OVR REL GBL SHR NOEXE RD WRT LONG
14 GRDRS	13236	PIC OVR REL GBL SHR NOEXE RD WRT LONG
15 GRDSV	851872	PIC OVR REL GBL SHR NOEXE RD WRT LONG
16 SUPCOM	444452	PIC OVR REL GBL SHR NOEXE RD WRT LONG
17 TCCOM	58636	PIC OVR REL GBL SHR NOEXE RD WRT LONG
Total Space Allocated	4177845	

ENTRY POINTS

Address	Type	Name	References
0-00000000		GC	1#

VARIABLES

Address	Type	Name	Attributes	References				
2-000CE0D0	R*4	ADJA		3815=	3844=	3867		
2-000CE0D4	R*4	ADJD		3816=	3837=	3876		
2-000CDFD8	R*4	ALAM1		3265A	3311	3325	3337	3351
2-000CDFE8	R*4	ALAM2		3275A	3312	3324	3338	3350

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  2-000CDF78  R*4  ALOAD                      3191=    3193     3196

  2-000CE0A0  R*4  APCSD                      3538=    3539     3540
  2-000CE094  R*4  BTPRAT                     3535=    3538     3916=    3929(2)
  8-00001134  R*4  CURINP          COMM        936     3497=    3501=    3509=    3513=    3541=
                                              3864=    3873=
  8-00001138  R*4  CURVES          COMM        937     3499     3503     3511     3515     3543
                                              3866     3875
  2-000CDCB8  R*4  DIST                       1836=    1837     1887     3428=    3429     3480
                                              4270=    4271     4345=    4346     4351     4527=
                                              4528     4533

  2-000CE0A4  R*4  DSH                        3540=    3541     3597     3802
 13-00034ABC  R*4  EFCE            COMM       1176     3265A    3275A
  4-0004104C  R*4  END_AGWK        COMM        525
  9-00009C27  CHAR END_COMCH       COMM       1035     1074
 10-00026918  R*4  END_GC          COMM       1111

 11-00000E64  R*4  END_GCHIM       COMM       1121
 12-00035AC4  R*4  END_GCRS        COMM       1156
 15-000CFF9C  R*4  END_GSV         COMM       1284
 13-00035418  R*4  FASFRC          COMM       1180     3827
 13-0003541C  R*4  FCABFD          COMM       1181

 13-00035420  R*4  FCDBFD          COMM       1182
 13-0003543C  R*4  FDSFRC          COMM       1186     3829
  2-000CE0AC  R*4  FFF                        3581=    3582=    3583     3584=    3585=    3586
  2-000CDC48  R*4  FRAC                       1649=    1653     4057=    4059     4063=    4065
                                              4070     4144=    4146     4148     4151=    4153
                                              4155     4156=    4158     4160     4162     4164
                                              4471=    4472=    4473     4474     4475
  2-000CDCBC  R*4  FRACW                      1837=    1867     1869     1885     1886     3429=
                                              3438     3440     3456     3458     3472     3474
                                              3476     3478     4271=    4272     4300     4346=
                                              4350     4528=    4532

  2-000CE0C8  R*4  FRCA                       3813=    3827=    3864     3879     3888
  2-000CE0CC  R*4  FRCD                       3814=    3831=    3832     3833     3834     3873
                                              3880     3888
  2-000CDC50  R*4  FRM                        1651=    1652(2)= 1653     1654     1655
  2-000CE264  I*4  I                          4513=    4514=    4515     4516=    4517=    4518=
                                              4539
  2-000CDF70  I*4  IAC                        3188=    3189     3190     3191(2)  3193(3)  3196(3)
                                              3231=    3232     3234=    3235     3302=    3304
                                              3305     3306     3310=    3311(2)  3312(2)  3315=
                                              3317     3318     3319     3323=    3324(2)  3325(2)
                                              3389(2)= 3391(2)= 3613=    3614(2)  3615(2)  3618(2)=
                                              3964=    3965(2)  3988=    3989(3)  3996(2)  3997
                                              4013=    4014(2)  4035=    4036(3)  4038(2)  4039
                                              4064=    4065(2)  4066     4100=    4101(3)  4103
                                              4123=    4124(3)  4126     4157=    4158(2)  4232=
                                              4233(3)  4421=    4422     4451=    4452(2)  4587=
                                              4588     4712=    4713(4)  4718(2)

  2-000CDFD4  I*4  IADDR                      3260=    3261     3262=    3263     3270=    3271
                                              3272=    3273     3304=    3305     3306     3317=
                                              3318     3319     3330=    3331     3332     3343=
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                                             3344      3345
2-000CDC74  I*4  IAM                         1720=     1721(2)   1722(2)   1729=     1730      1731
                                             2095=     2096(2)   2097(2)   2123=     2124(2)   2125(2)
                                             3127=     3128(2)   3129(2)   3144=     3148      3149
                                             3150      3151      3155(2)   3160(2)   3192=     3193(3)
                                             3196(3)   3225=     3226      3228=     3229      4711=
                                             4713(3)   4718(3)
2-000CE044  I*4  IC                          3418=     3498(3)   3502(3)   3510(3)   3514(3)   3906=
                                             3934(2)   4304=     4305(2)   4306(3)   4344=     4366(2)
                                             4368(3)   4373(2)   4383(2)=  4406=     4407      4408
                                             4470=     4473(2)   4526=     4541(2)   4543(2)   4549(2)
                                             4559=     4561      4563
8-0000113C  I*4  ICH               COMM       938
2-000CDC94  I*4  ICHECK                      1769=     1771=     1773

5-0002C1FC  I*4  ICHEM             COMM       642
8-00001140  I*4  ICHSTT            COMM       939
5-0002C200  I*4  ICLRCY            COMM       643
2-000CDF28  I*4  ICNT                        3061=     3062      3063      3072      3085(2)=  3086
5-0002C204  I*4  ICOORD            COMM       644

8-000014B4  I*4  ICPP              COMM       941
5-0002C230  I*4  ICSM              COMM       646
6-0000E67C  I*4  ICYCLE            COMM       878      1635      1669      1781      1941      1987
                                             2715      2743      2756      2765      2773      2781
                                             2803      2830      2843      2851      2872      2899
                                             3091      3279      4186      4194      4613      4642
2-000CE040  I*4  ID                          3412=     3413      3418      3419      3420      3428
                                             3438(3)   3440(3)   3442      3443      3456      3458
                                             3469      3470      3472(3)   3474(3)   3476      3478
                                             3481(3)   3483(3)   3485      3487      3496(2)   3500
                                             3504      3507      3508      3512      3516      3517
                                             3518      3535      3537      3540      3547(2)   3548(2)
                                             3550      3551      3555      3556      3559(3)   3560(3)
                                             3562      3563      3564      3565      3566      3567
                                             3568      3569      3570      3571      3572(2)   3573(2)
                                             3574      3575      3582(2)   3583      3585(2)   3586
                                             3590      3592(8)   3783=     3787      3788      3905=
                                             3906      3907      3916      3917(2)   3919      3921
                                             3931      3932(2)   4265=     4269      4270      4272
                                             4273      4300      4301(2)   4304      4339=     4343
                                             4344      4345      4350      4352      4365(2)   4371(2)
                                             4372(2)   4460=     4461      4465=     4466      4468
                                             4469(2)   4470      4490=     4495(4)   4521=     4525
                                             4526      4527      4532      4534      4545(2)   4627=
                                             4628      4629      4630(16)
5-0002C25C  I*4  IDFRD             COMM       648

2-000CE290  I*4  IDI                         4626=     4627
5-0002C260  I*4  IDLYTR            COMM       649
2-000CDCA8  I*4  IDS                         1823=     1827      3411=     3412      3782=     3783
                                             3904=     3905      4264=     4265      4338=     4339
                                             4459=     4460      4464=     4465      4489=     4490
                                             4520=     4521
2-000CDE2C  I*4  IENDW                       2705=     2708      2710(2)=  2712(2)=  2714      2715
                                             2720      2728=     2736      2738(2)=  2740(2)=  2742
                                             2743      2748      2791=     2796      2798(2)=  2800(2)=
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                                              2802      2803      2808      2815=     2823      2825(2)=
                                              2827(2)=  2829      2830      2835      2861=     2865
                                              2867(2)=  2869(2)=  2871      2872      2877      2884=
                                              2892      2894(2)=  2896(2)=  2898      2899      2904
                                              3356=     3358      3360(2)=  3362(2)=  3364      3366
                                              3368      3373=     3375      3377(2)=  3379(2)=  3381
                                              3383      3384
2-000CDFDC  I*4  IFLAG                        3265A     3267      3275A     3278      3664=     3675=
                                              3689

2-000CDF24  I*4  IFLG                         3060=     3062      3077=     3083=     3086=
8-000014B8  I*4  IGO                 COMM      942
2-000CDCF4  I*4  IGWT                         1960=     1961      1962      2023=     2027      2028
                                              2029      2030      2031(2)   2078=     2080      2081
                                              2082      2085=     2088      2089      2091      2092
                                              2096      2097      2100      2101      2106=     2108
                                              2109      2110      2113=     2116      2117      2119
                                              2120      2124      2125      2128      2129      3069=
                                              3070      3072      3074
2-000CDCD8  I*4  II                           1943=     1945      1950      1951      1954      1955
                                              1956      1957      1958      1959      1960      1964(2)
                                              1965(2)   1973      1977      1978      1979      1980
                                              1981(2)   1987      1989      1990      2004      2076
                                              2088      2089      2095      2096(2)   2097(2)   2099
                                              2100(2)   2101(2)   2116      2117      2123      2124(2)
                                              2125(2)   2127      2128(2)   2129(2)   2136(2)   2137(2)
                                              2150      2151      2152      2153      2157(2)   2162(2)
                                              2173(2)   2174(2)   2215      2229      2230      2235(2)
                                              2240      2241      2245      2250      2251      2252
                                              2254      2262      2267(2)   2272      2273      2277
                                              2282      2283      2284      2286      2543      2546
                                              2547      2552      2553(2)   2554(2)   2556(3)   2557(3)
                                              2563      2564      2569      2570(2)   2571(2)   2573(3)
                                              2574(3)   2581      2582      2583(2)   2584      2585
                                              2586      2587      2588      2589      2592      2601
                                              2602(2)   2603      2604      2605      2606      2607
                                              2608      2611      2624      2627(2)   2628(2)   2634(2)
                                              2635(2)   2642      2643      2646      2648      2654
                                              2657      2659      2672(3)   2673(3)   2678      2679
                                              2680      2681(3)   2683(3)   2694(3)   2695(3)   2715
                                              2720(2)   2743      2748(2)   2754      2755      2759
                                              2760      2761      2768      2769      2770      2776
                                              2777      2778      2784      2785      2786      2808(2)
                                              2835(2)   2842      2846      2847      2848      2854
                                              2855      2856      2877(2)   2904(2)   2915      2917
                                              2921      2924      2930(3)   2931(3)   2937      2938
                                              2939(2)   2940      2941      2942      2943      2944
                                              2945(2)   2947(3)   2955      2956(2)   2957      2958
                                              2959      2960      2961      2962(2)   2964(3)   2978(3)
                                              2979(3)   2982      2983      2984(2)   2985      2986
                                              2987      2988      2989      2990(2)   2992(3)   3000
                                              3001(2)   3002      3003      3004      3005      3006
                                              3007(2)   3009(3)   3023      3024      3025(2)   3026(2)
                                              3034      3035      3036(2)   3037(2)   3121=     3123
                                              3124      3128(2)   3129(2)   3134(2)   3135(2)   3148
                                              3149      3150      3151      3155(2)   3160(2)   3168
                                              3169      3170      3171      3175(2)   3180(2)   3185
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                                                3186     3189     3190     3191(2)  3193(4)  3196(4)
                                                3201     3202     3203     3205(5)  3208(5)  3218=
                                                3220     3221     3222     3223     3224     3226
                                                3227     3229     3230     3232     3233     3235
                                                3236     3237     3238     3239     3240     3241
                                                3242     3243     3244     3245     3246     3247
                                                3646=    3648(3)  3657     3660(3)  3677(3)  3681
                                                3686     3703     3707(3)  3721(3)  3725     3730
                                                3820=    3821(3)  3823     3824     3825(3)  3829(3)
                                                3853     3858     3874(2)  3876     3877(3)  3878(3)
                                                3880     3882(2)  3884(2)  3947=    3950     3951
                                                3952     3962(2)  3965(2)  3969(2)  3983(3)  3985
                                                3989(3)  3996(3)  3997     4001(3)  4003     4011(2)
                                                4014(2)  4018(2)  4030(3)  4032     4036(3)  4038(3)
                                                4039     4043(3)  4045     4059(2)  4060     4065(2)
                                                4066     4070(2)  4071     4095(3)  4097     4101(3)
                                                4103     4107(3)  4109     4118(3)  4120     4124(3)
                                                4126     4130(3)  4132     4146(2)  4153(2)  4158(2)
                                                4162(2)  4172     4173     4174     4175     4177
                                                4178(3)  4180     4184     4185     4186     4192
                                                4194     4198(2)  4205     4207(4)  4230(3)  4233(3)
                                                4236(3)  4280     4281(3)  4283     4284     4285
                                                4288(3)  4290     4291     4292     4295     4412=
                                                4414     4415     4416     4418     4420     4422
 2-000CDC7C   I*4   IMM                         1724=    1725(2)  1726(2)  1733=    1734     1735
                                                2099=    2100(2)  2101(2)  2127=    2128(2)  2129(2)
                                                3133=    3134(2)  3135(2)  3164=    3168     3169
                                                3170     3171     3175(2)  3180(2)  3204=    3205(3)
                                                3208(3)  3237=    3238     3240=    3241

 2-000CDF68   I*4   IMT                         3186=    3193     3196     4709=    4713     4718
 8-000014BC   I*4   INCYL              COMM      943
 9-00009C18   CHAR  IND                COMM     1032     1071
 8-000014C0   I*4   INO                COMM      944
 8-000014C4   I*4   INOSTT             COMM      945

 2-000CDD8C   I*4   INSMFR                      2250=    2251     2282=    2283     2587=    2588
                                                2606=    2607     2943=    2944     2960=    2961
                                                2988=    2989     3005=    3006
 2-000CDCEC   I*4   INSMT                       1959=    1960
 2-000CDD04   I*4   INSMW                       1979=    1980     2240=    2241     2272=    2273
                                                2584=    2585     2603=    2604     2759=    2760
                                                2768=    2769     2776=    2777     2784=    2785
                                                2846=    2847     2854=    2855     2940=    2941
                                                2957=    2958     2985=    2986     3002=    3003
 2-000CDCC0   I*4   INWPC                       1865=    1866     1882=    1883
 2-000CDCF8   I*4   INWTIGT                     1961=    1962

 5-0002C6CC   I*4   IOMU               COMM      655     3558(2)
 2-000CE0F4   I*4   IPCAF                       3854=    3855(2)
 2-000CE0FC   I*4   IPCDF                       3857=    3858(2)
13-00037A48   I*4   IPLSC              COMM     1202     4254     4363
 5-0002C748   I*4   IPOPIN             COMM      657

 5-0002C74C   I*4   IPRB               COMM      658     1632     1633=    1639=    1661     1780
                                                3215     3617     3635     3766     3800     3886
                                                3939     4216     4379     4395     4481     4557
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                                                 4607      4725=
  2-000CDC38   I*4  IPRBST                       1632=     4725
  8-000014C8   I*4  IPRD                COMM      946
  5-0002C7F0   I*4  IPRS                COMM      660
  8-000014CC   I*4  IPT                 COMM      947

  8-000014D0   I*4  IPTSTT              COMM      948
  2-000CE2D0   I*4  IR                           4682=     4683      4685      4687      4688      4690(2)
                                                 4692(2)   4696(2)   4698(2)
 13-00037A4C   I*4  IRDOFF              COMM     1203
  4-0003BAB4   I*4  IS                  COMM      462      1619=     1620      1621      1624(4)   1626(4)
                                                 1650=     1651      1653      1655(2)   1656(3)   1763=
                                                 1766      1767      1768      1771      1776      1781
                                                 1785      1797      1803(2)A  1804      1805(2)   1810
                                                 1816      1820      1822      1827      1836      1869(2)
                                                 1886(2)   1889(2)   1902      1903      1906      1907
                                                 1909      1911      1912      1913      1914      1915
                                                 1916      1922      1923(4)   1925      1926      1927
                                                 1928      1957      1963      1981      1990      2006
                                                 2009      2031      2082      2110      2152      2153
                                                 2157      2162      2245      2277      2586      2605
                                                 2702(2)   2732(2)   2917      2921      2923(2)A  2931(2)
                                                 2942      2945      2947(3)   2959      2962      2964(3)
                                                 2979(2)   2987      2990      2992(3)   3004      3007
                                                 3009(3)   3064      3075      3088      3089      3090
                                                 3091      3095      3096      3097      3102      3103
                                                 3105      3107      3115(2)   3191      3265(2)   3275(3)
                                                 3279      3283      3284      3285      3287      3293
                                                 3294      3295      3308(2)   3309(2)   3311(2)   3312(2)
                                                 3321(2)   3322(2)   3324(2)   3325(2)   3334(2)   3335(2)
                                                 3337(2)   3338(2)   3347(2)   3348(2)   3350(2)   3351(2)
                                                 3368      3384      3389      3391      3393      3395
                                                 3405      3407      3409      34[illegible] 3428  3438
                                                 3440      3442      3443      34[illegible] 3460  3469
                                                 3470      3472      3474      3476      3478      3481
                                                 3483      3485      3487      3574(2)   3575(2)   3583(2)
                                                 3586(2)   3604(2)   3610      3611      3614(4)   3615(4)
                                                 3618(2)   3626      3627      3630(4)   3631(4)   3637(2)
                                                 3639(2)   3644      3645(2)A  3647      3648(3)   3649
                                                 3650      3652      3655(3)   3657      3660(7)   3663(2)
                                                 3665(2)   3669      3675(2)   3677(6)   3686      3687
                                                 3690      3693      3701(3)   3703      3704      3707(7)
                                                 3710(2)   3711      3715      3721(6)   3730      3731
                                                 3733      3735      3743(3)   3745      3746      3752(2)
                                                 3753(2)   3757(2)A  3758      3759      3764(3)   3768
                                                 3770      3778      3780      3783      3790      3796
                                                 3821(3)   3823      3824      3825(3)   3827(3)   3829(3)
                                                 3831(3)   3833      3834      3835(3)   3847      3850
                                                 3868      3877      3879      3880      3881      3882
                                                 3883      3884      3899      3903      3905      3924
                                                 3962      3965      3969      3972      3980      3983
                                                 3989      4001      4005      4011      4014      4018
                                                 4021      4027      4030      4036      4043      4047
                                                 4055      4057(2)   4063      4073      4092      4095
                                                 4101      4107      4111      4115      4118      4124
                                                 4130      4134      4142      4143      4144      4151(2)
                                                 4156      4166      4173      4174      4175      4178(3)
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                                          4180      4192      4198      4207(4)   4230(2)   4233(2)
                                          4236(2)   4257      4259      4260(2)   4262      4263
                                          4265      4270      4280      4281(3)   4283      4284
                                          4285      4288(3)   4290      4291      4292      4296(2)
                                          4297(2)   4298(2)   4302(2)   4303      4305(2)   4323(2)
                                          4324(2)   4325(2)   4334      4336      4339      4345
                                          4356      4366(2)   4367(2)   4373(2)   4381      4383
                                          4391      4399      4408      4435      4436      4443
                                          4445(3)   4448      4452      4455      4457(2)   4460
                                          4465      4467      4483      4486      4490      4509
                                          4511      4521      4527      4538      4541(2)   4549(2)
                                          4574(3)   4575      4577(3)   4578      4580(2)   4583(2)
                                          4588      4591(2)   4593(2)   4642(2)=  4646(2)=  4649(2)=
                                          4652(2)=  4654(2)=  4656(2)=  4658(2)=  4660(2)=  4662(2)=
                                          4664(2)=  4666(2)=  4668(2)=  4670(2)=  4689=     4690
                                          4692      4710=     4713(3)   4718
2-000CE2DC  I*4  IS1                      4687=     4689      4695

2-000CE2E0  I*4  IS2                      4688=     4689      4695
2-000CDC9C  I*4  ISATT                    1803=     1804      1814      2004      2923=     2924
                                          3094      3282      3645=     3646      3650      3652
                                          3655(3)   3660(3)   3665      3669      3675      3677(3)
                                          3693      3701(3)   3707(3)   3711      3715      3721(3)
                                          3757=     3758      3759      3819      3918      3958
                                          3974      4090      4217      4514      4573
4-0003BAB8  I*4  ISDAC            COMM     463
5-0002CC14  I*4  ISEFFD           COMM     668      3524      3546
2-000CDCE0  I*4  ISM                      1950=     1951      1955=     1956      1957      1958
                                          1959      1960      1964(2)   1965(2)   1977=     1978
                                          1979      1980      1981      1989=     1990      2090=
                                          2091(2)   2092(2)   2118=     2119(2)   2120(2)   2215=
                                          2218      2219      2220      2221      2222      2223
                                          2224      2225      2230=     2235(2)   2240      2241
                                          2250      2251      2252(2)   2254(2)   2262=     2267(2)
                                          2272      2273      2282      2283      2284(2)   2286(2)
                                          2552=     2553      2554      2569=     2570      2571
                                          2582=     2583(2)   2584      2585      2587      2588
                                          2589(2)   2592(2)   2601=     2602(2)   2603      2604
                                          2606      2607      2608(2)   2611(2)   2643=     2646(3)
                                          2648(3)   2654=     2657(3)   2659(3)   2680=     2681
                                          2683      2755=     2756      2759      2760      2761
                                          2765      2768      2769      2770      2773      2776
                                          2777      2778      2781      2784      2785      2786
                                          2842=     2843      2846      2847      2848      2851
                                          2854      2855      2856      2915=     2917      2938=
                                          2939(2)   2940      2941      2943      2944      2945(2)
                                          2947(3)   2955=     2956(2)   2957      2958      2960
                                          2961      2962(2)   2964(3)   2983=     2984(2)   2985
                                          2986      2988      2989      2990(2)   2992(3)   3000=
                                          3001(2)   3002      3003      3005      3006      3007(2)
                                          3009(3)   4177=     4178(2)   4180      4185=     4186
                                          4192      4194      4198      4205=     4207(3)

2-000CE098  I*4  ISPT                     3536=     3537      3538      3540      3542(2)   3544
                                          3900=     3901      3923=     3925      3927      3929
                                          3931      3932(2)   3933(2)   3934(2)   3941(2)=  4441=
                                          4443      4445(3)   4448      4452      4455      4457(2)
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                                                      4461      4466      4467      4468      4469(2)   4473(2)
                                                      4474(2)   4475(2)   4483(2)=  4495(2)=
  2-000CDC40  I*4  ISSM                               1648=     1649      1651(2)   1652(2)   1653      1654(2)
                                                      1655(2)   1656(3)   3201=     3202      3203      3205(3)
                                                      3208(3)   3243=     3244      3246=     3247      3328=
                                                      3330      3331      3332      3336=     3337(2)   3338(2)
                                                      3341=     3343      3344      3345      3349=     3350(2)
                                                      3351(2)   3393(2)=  3395(2)=  3629=     3630(2)   3631(2)
                                                      3968=     3969(2)   4000=     4001(3)   4003      4017=
                                                      4018(2)   4042=     4043(3)   4045      4069=     4070(2)
                                                      4071      4106=     4107(3)   4109      4129=     4130(3)
                                                      4132      4161=     4162(2)   4235=     4236(3)   4454=
                                                      4455(2)
  2-000CDE34  I*4  ISTW                               2708=     2714      2715      2720      2736=     2742
                                                      2743      2748      2796=     2802      2803      2808
                                                      2823=     2829      2830      2835      2865=     2871
                                                      2872      2877      2892=     2898      2899      2904
                                                      3358=     3364      3366      3368      3375=     3381
                                                      3383      3384
 10-0001EF74  I*4  ISUM_COLLAPSED          COMM       1092
  5-0002CCF8  I*4  ISVHIM                  COMM        673

  2-000CDCB4  I*4  IT                                 1828=     1832      1868(2)   3413=     3417      3455(2)
                                                      3457(2)   3535      3538      3544      3590      3907=
                                                      3911      3916      3925      3927      3929      4494
  5-0002CCFC  I*4  ITA                     COMM        674      1769
  2-000CDC3C  I*4  ITAR                               1647=     1655(2)   1656(2)
  8-000014D4  I*4  ITM                     COMM        949
  8-000014D8  I*4  ITMSTT                  COMM        950

 13-00037A58  I*4  IUSFRC                  COMM       1205
  5-0002D660  I*4  IUTAM                   COMM        676
  2-000CDC60  I*4  IW                                 1680=     1681(2)   1683(2)   1689=     1690      1691
                                                      1700=     1701(2)   1703(2)   1709=     1710      1711
                                                      1748=     1749      1750      1818=     1819      1820
                                                      1866=     1867(3)   1868      1869(3)   1883=     1884
                                                      1885(3)   1886(3)   1887      1888(3)   1889(3)   1900=
                                                      1901      1902      1903      1904(3)   1949=     1951
                                                      1962=     1963      1965      1980=     1981(2)   2030=
                                                      2031      2077=     2078      2082      2085      2088
                                                      2089      2091      2092      2096      2097      2100
                                                      2101      2105=     2106      2110      2113      2116
                                                      2117      2119      2120      2124      2125      2128
                                                      2129      2134=     2136(2)   2137(2)   2149=     2150
                                                      2151      2152(2)   2153(2)   2156=     2157(3)   2161=
                                                      2162(3)   2216=     2218      2219      2220      2221
                                                      2222      2223      2224      2225      2251=     2252(3)
                                                      2254(3)   2283=     2284(3)   2286(3)   2544=     2546
                                                      2547      2550=     2553(3)   2554(3)   2556(3)   2557(3)
                                                      2561=     2563      2564      2567=     2570(3)   2571(3)
                                                      2573(3)   2574(3)   2588=     2589(2)   2592(2)   2607=
                                                      2608(2)   2611(2)   2625=     2627(2)   2628(2)   2632=
                                                      2634(2)   2635(2)   2644=     2646(3)   2648(3)   2655=
                                                      2657(3)   2659(3)   2670=     2672(3)   2673(3)   2676=
                                                      2678      2679      2681(3)   2683(3)   2692=     2694(3)
                                                      2695(3)   2715(2)=  2720(2)=  2743(2)=  2748(2)=  2761(2)=
                                                      2770(2)=  2778(2)=  2786(2)=  2803(2)=  2808(2)=  2830(2)=
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                                       2835(2)=  2848(2)=  2856(2)=  2872(2)=  2877(2)=  2899(2)=
                                       2904(2)=  2928=     2930(2)   2931      2944=     2945(2)
                                       2947      2961=     2962(2)   2964      2976=     2978(2)
                                       2979      2989=     2990(2)   2992      3006=     3007(2)
                                       3009      3022=     3025(2)   3026(2)   3033=     3036(2)
                                       3037(2)   3126=     3128(2)   3129(2)   3132=     3134(2)
                                       3135(2)   3147=     3148      3149      3150(2)   3151(2)
                                       3154=     3155(3)   3159=     3160(3)   3167=     3168
                                       3169      3170(2)   3171(2)   3174=     3175(3)   3179=
                                       3180(3)   3187=     3189      3190      3193(4)   3196(4)
                                       3202      3203      3205(4)   3208(4)   3226(2)=  3229(2)=
                                       3232(2)=  3235(2)=  3238(2)=  3241(2)=  3244(2)=  3247(2)=
                                       3258=     3260      3261      3262      3263      3268=
                                       3270      3271      3272      3273      3316=     3317
                                       3318      3319      3342=     3343      3344      3345
                                       3366(2)=  3368(2)=  3383(2)=  3384(2)=  3437=     3438(2)
                                       3440(2)   3442(2)   3443(2)   3455      3456      3457
                                       3458      3459      3460      3468=     3469(2)   3470(2)
                                       3471      3472(2)   3474(2)   3476(2)   3478(2)   3480
                                       3481(2)   3483(2)   3485(2)   3487(2)   3959=     3960
                                       3962(3)   3965(3)   3969(3)   3972(2)   3979=     3980
                                       3981      3983(2)   3985(3)   3987      3989(2)   3996(2)
                                       3997(3)   3999      4001(2)   4003(3)   4005(4)   4008=
                                       4009      4011(3)   4014(3)   4018(3)   4021(2)   4026=
                                       4027      4028      4030(2)   4032(3)   4034      4036(2)
                                       4038(2)   4039(3)   4041      4043(2)   4045(3)   4047(4)
                                       4054=     4055(2)   4056      4057(2)   4059(2)   4060(3)
                                       4062      4063(2)   4065(2)   4066(3)   4068      4070(2)
                                       4071(3)   4073(4)   4091=     4092      4093      4095(2)
                                       4097(3)   4099      4101(2)   4103(3)   4105      4107(2)
                                       4109(3)   4111(4)   4114=     4115      4116      4118(2)
                                       4120(3)   4122      4124(2)   4126(3)   4128      4130(2)
                                       4132(3)   4134(4)   4141=     4142(2)   4143(2)   4144(2)
                                       4146(2)   4148(2)   4151(2)   4153(2)   4155(2)   4156(2)
                                       4158(2)   4160(2)   4162(2)   4164(2)   4166(4)   4189(2)=
                                       4192(2)=  4228=     4230(3)   4233(3)   4236(3)   4317=
                                       4318(2)   4319(2)   4320(2)   4347=     4348      4349
                                       4350      4351      4352      4356(2)   4364      4371(2)
                                       4372(2)   4373(2)   4390=     4391(3)   4399(2)=  4408(2)=
                                       4418(2)=  4422(2)=  4444=     4445(2)   4495(2)=  4529=
                                       4530      4531      4532      4533      4534      4538(2)
                                       4539      4541(3)   4543(3)   4545(3)   4549(3)   4563(2)=
                                       4582=     4583(2)   4592=     4593(2)   4684=     4685
                                       4691=     4692(3)   4697=     4698(2)
2-000CDF34   I*4   IWEP                3074=     3075      3076
2-000CE058   I*4   IWIC                3436=     3437      3467=     3468

2-000CDD0C   I*4   IWORD               1981(2)=  2761(2)=  2770(2)=  2778(2)=  2786(2)=  2848(2)=
                                       2856(2)=  4189(2)=  4198(2)=
2-000CDCCC   I*4   IWPC                1880=     1881      1882      1883      3465=     3466
                                       3467      3468
2-000CDE24   I*4   IWRD                2702(2)=  2715(2)=  2720(2)=  2732(2)=  2743(2)=  2748(2)=
                                       2803(2)=  2808(2)=  2830(2)=  2835(2)=  2872(2)=  2877(2)=
                                       2899(2)=  2904(2)=  3366(2)=  3383(2)=
2-000CDD1C   I*4   IWTGT               2029=     2030
2-000CDF2C   I*4   IWUCEE              3063=     3064      3069      3072      3076=     3088
                                       3089      3265A     3275A
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 2-000CDCB0  I*4  JDS                           1827=    1828     1836     1867     1869     1885
                                                1886     1888     1889
 5-0002DFC4  I*4  JESCFG              COMM       678
 8-000014DC  I*4  JIN                 COMM       951
 9-00009C1B  CHAR JNAMEF              COMM      1033     1072
 5-0002DFC8  I*4  JNSW                COMM       679

 8-000014E0  I*4  JOUT                COMM       952
 2-000CDD2C  I*4  JW                            2087=    2088(2)  2089(2)  2091(2)  2092(2)  2115=
                                                2116(2)  2117(2)  2119(2)  2120(2)  2135=    2136(2)
                                                2137(2)  2146=    2150     2151     2152     2153
                                                2157(2)  2162(2)  2172=    2173(2)  2174(2)  2217=
                                                2218     2219     2220     2221     2222     2223
                                                2224     2225     2241=    2245     2252(3)  2254(3)
                                                2273=    2277     2284(3)  2286(3)  2545=    2546
                                                2547     2551=    2553(3)  2554(3)  2556(3)  2557(3)
                                                2562=    2563     2564     2568=    2570(3)  2571(3)
                                                2573(3)  2574(3)  2585=    2586     2589(3)  2592(3)
                                                2604=    2605     2608(3)  2611(3)  2626=    2627(3)
                                                2628(3)  2633=    2634(3)  2635(3)  2645=    2646(3)
                                                2648(3)  2656=    2657(3)  2659(3)  2671=    2672(3)
                                                2673(3)  2677=    2678     2679     2681(3)  2683(3)
                                                2693=    2694(3)  2695(3)  2719=    2720(2)  2747=
                                                2748(2)  2760=    2761(2)  2769=    2770(2)  2777=
                                                2778(2)  2785=    2786(2)  2807=    2808(2)  2834=
                                                2835(2)  2847=    2848(2)  2855=    2856(2)  2876=
                                                2877(2)  2903=    2904(2)  2916=    2917     2920=
                                                2921     2929=    2930(3)  2931(3)  2941=    2942
                                                2945(3)  2947(3)  2958=    2959     2962(3)  2964(3)
                                                2977=    2978(3)  2979(3)  2986=    2987     2990(3)
                                                2992(3)  3003=    3004     3007(3)  3009(3)  3024=
                                                3025(2)  3026(2)  3035=    3036(2)  3037(2)  3259=
                                                3260     3261     3262     3263     3269=    3270
                                                3271     3272     3273     3303=    3304     3305
                                                3306     3329=    3330     3331     3332     4176=
                                                4178(2)  4191=    4192     4197=    4198(2)  4206=
                                                4207(2)
 2-000CDF14  I*4  JWIC                          3023=    3024     3034=    3035
 4-0003BABC  I*4  K                   COMM       464     1672=    1673     1678     1681     1683
                                                1698     1701     1703     1719     1721     1722
                                                1725     1726     1921=    1922     1925     1926
                                                1927     1928     4437=    4438     4439     4440
                                                4445(2)  4452(2)  4455(2)  4571=    4573     4574(3)
                                                4575     4577(3)  4578     4585     4588
17-0000B144  I*4  KDVSUB              COMM      1508

 8-000014E4  I*4  KFLAG               COMM       953
 8-000014E8  I*4  KISS                COMM       954
 5-0002E1DC  I*4  KOCNUC              COMM       684
 2-000CDC5C  I*4  KP                            1679=    1681(2)  1683(2)  1688=    1690     1691
                                                1699=    1701(2)  1703(2)  1708=    1710     1711
                                                1810=    1813     2171=    2173(2)  2174(2)  3644=
                                                3665     3675     3681     3711     3725     4516(3)
                                                4517(2)  4518
 2-000CDD18  I*4  KPA                           2006=    2008=    2088     2116     2589(2)  2608(2)
                                                2627(2)  2634(2)  2930     2945     2962
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2-000CE0F0  I*4  KPCAS                 3848=    3850=    3855     3858     3925     3927
                                       4095     4101     4107     4118     4124     4130
2-000CDD14  I*4  KPD                   2005=    2009=    2089     2117     2592(2)  2611(2)
                                       2628(2)  2635(2)  2978     2990     3007     3026
                                       3037
5-0002E460  I*4  KPECY         COMM     689
5-0002E464  I*4  KPECYD        COMM     690
2-000CDCA0  I*4  KPI                   1813=    1814=    1868     3405=    3457

8-000014EC  I*4  KPMXA         COMM     955
8-000014F0  I*4  KPMXAA        COMM     956
8-000014F4  I*4  KPMXC         COMM     957
8-000014F8  I*4  KPMXCA        COMM     958
8-000014FC  I*4  KPMXG         COMM     959

8-00001500  I*4  KPMXGA        COMM     960
8-00001504  I*4  KPMXI         COMM     961
8-00001508  I*4  KPMXN         COMM     962
8-0000150C  I*4  KPMXNA        COMM     963
5-0002FD7C  I*4  KSTOPB        COMM     714     1923     3743

2-000CDC98  I*4  KTI                   1797=    1868     3025     3026     3036     3037
                                       3455     3457
2-000CE120  I*4  KW                    3961=    3962(2)  3982=    3983(3)  3985     4010=
                                       4011(2)  4029=    4030(3)  4032     4058=    4059(2)
                                       4060     4094=    4095(3)  4097     4117=    4118(3)
                                       4120     4145=    4146(2)  4152=    4153(2)  4229=
                                       4230(3)  4417=    4418
2-000CDC58  I*4  KWGT                  1677=    1678     1681(3)  1683(3)  1690     1691
                                       1697=    1698     1701(3)  1703(3)  1710     1711
                                       1718=    1719     1721(3)  1722(3)  1725(3)  1726(3)
                                       1730     1731     1734     1735
4-0003BAC0  I*4  L             COMM     465     1620=    1621     1622     1623     1646=
                                       1647     1648     1649     1651(2)  1652(2)  1653
                                       1654(2)  1656     1670=    1671     1672     1674
                                       1675     1676     1721(2)  1722(2)  1725(2)  1726(2)
                                       1730     1731     1734     1735     1744=    1745
                                       1746     1747     1749     1750     1757=    1758(2)
                                       1759(2)  1760     1761     1764=    1765     1766
                                       1767     1774     1776     1785(4)= 1812=    1814
                                       1816     1817     1819     1820     1822     1837(2)
                                       1865     1866     1867(2)  1869(2)  1881     1882
                                       1883     1884     1885(2)  1886(2)  1887     1888(2)
                                       1889(2)  1897=    1898     1899     1901(3)  1902
                                       1903     1904(3)  1906     1907     1910=    1911
                                       1912     1913     1914     1915     1916     1919=
                                       1920     1921     1942=    1943     1944     1961
                                       1962     1963     2027     2028     2029     2030
                                       2031(3)  2078     2081     2082(2)  2106     2109
                                       2110(2)  2152     2153     2157     2162     2704
                                       2715(2)  2727     2743(2)  2790     2803     2814
                                       2830     2860     2872     2883     2899     3120=
                                       3121     3122     3150     3151     3155     3160
                                       3170     3171     3175     3180     3217=    3218
                                       3219     3224     3227     3230     3233     3236
                                       3239     3242     3245     3354=    3355     3365
```

```
                                        3366      3368      3372      3382      3383      3384
                                        3387      3388      3389      3390      3391      3392
                                        3393(2)   3394      3395(2)   3406=     3407      3409
                                        3410      3429(2)   3436      3437      3438      3440
                                        3442      3443      3459      3460      3466      3467
                                        3468      3469      3470      3471      3472      3474
                                        3476      3478      3480      3481      3483      3485
                                        3487      3542(3)   3574(2)   3575(2)   3583(2)   3586(2)
                                        3604(3)=  3609=     3610      3611      3612      3614(4)
                                        3615(4)   3618(2)   3625=     3626      3627      3628
                                        3630(4)   3631(4)   3637(3)=  3639(3)=  3777=     3778
                                        3780      3790      3796      3819=     3820      3827(3)
                                        3831(3)   3833      3834      3835(3)   3852      3855
                                        3865(2)   3867      3868(3)   3869(3)   3879      3881(2)
                                        3883(2)   3890(4)=  3897=     3899      3901      3903
                                        3918      3924      3933(2)   3941(2)=  3946=     3947
                                        3948      3949      3958      3972      3975(3)   3976(2)
                                        3978      3980      3983      3989      4001      4005
                                        4021      4023(3)   4024(2)   4025      4027      4030
                                        4036      4043      4047      4055(2)   4057(2)   4063(2)
                                        4073      4090      4092      4095      4101      4107
                                        4111      4115      4118      4124      4130      4134
                                        4142(2)   4143      4144      4151(2)   4156(2)   4166
                                        4189      4217      4218      4221      4255      4262
                                        4263      4271(2)   4272      4273(2)   4296(2)   4297(2)
                                        4298(2)   4302(2)   4303(3)   4318      4319      4320
                                        4323(2)   4324(2)   4325(2)   4333=     4334      4336
                                        4337      4346(2)   4348      4349      4351      4356(2)
                                        4364      4367(2)   4381(2)=  4388=     4389      4391(3)
                                        4396=     4397      4398      4399      4402      4411=
                                        4412      4413      4416      4420      4433=     4435
                                        4436      4437      4443      4445(2)   4448      4457(2)
                                        4467      4474(2)   4475(2)   4483(2)=  4485=     4486
                                        4487      4488      4508=     4509      4511      4512
                                        4514      4528(2)   4530      4531      4533      4538(2)
                                        4539      4541      4543      4545      4549      4560=
                                        4561=     4562      4570=     4571      4580(2)   4581
                                        4583(2)   4591(2)   4593(2)   4599=     4600      4601(2)
                                        4604(3)   4648=     4649      4652      4654      4656
                                        4658      4660      4662      4664      4666      4668
                                        4670      4678=     4679      4681      4690      4692
                                        4708=     4709      4711      4712      4713(3)   4718(3)
 2-000CDE30   I*4  LINCNT               2706=     2723(2)=  2730      2733=     2750(2)=  2792=
                                        2810(2)=  2817      2820=     2837(2)=  2862=     2879(2)=
                                        2886      2889=     2906(2)=

 2-000CE2CC   I*4  M1                   4680=     4682
 2-000CE2C8   I*4  M2                   4677=     4680      4681(2)=  4682
17-0000BC38   I*4  MAPOUT      COMM     1510
13-00037AB8   I*4  MNIE        COMM     1207      3265A     3275A
 8-00001510   I*4  MOT         COMM      964      1635      1662A     1663A     1664A     1781
                                        1784      1785      1974      1981      1987      1990
                                        2702      2715      2720      2732      2743      2748
                                        2756      2761      2765      2770      2773      2778
                                        2781      2786      2793      2803      2808      2819
                                        2830      2835      2843      2848      2851      2856
                                        2863      2872      2877      2888      2899      2904
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                                          3091     3098     3108     3216     3224     3226
                                          3227     3229     3230     3232     3233     3235
                                          3236     3238     3239     3241     3242     3244
                                          3245     3247     3279     3289     3296     3365
                                          3366     3368     3382     3383     3384     3388
                                          3389     3390     3391     3392     3393     3394
                                          3395     3589     3590     3591     3592     3596
                                          3597     3603     3604     3618     3636     3637
                                          3638     3639     3767     3768     3769     3770
                                          3801     3802     3887     3888     3889     3890
                                          3940     3941     4186     4189     4192     4194
                                          4198     4218     4221     4224A    4225A    4226A
                                          4380     4381     4382     4383     4398     4399
                                          4407     4408     4416     4418     4420     4422
                                          4425A    4482     4483     4488     4495     4558
                                          4563     4607A    4613     4618     4630     4642
                                          4646     4649     4652     4654     4656     4658
                                          4660     4662     4664     4666     4668     4670

 8-00001514  I*4  MOTSTT          COMM     965
10-0001FB20  I*4  MPDAY           COMM    1096
 5-00031180  I*4  MVCASO          COMM     720     1941     2133     3056     3125     3957
 4-0003BAC4  I*4  N1              COMM     466     1815=    1823     3408=    3411     3779=
                                          3782     3898=    3904     4256=    4259=    4264
                                          4335=    4338     4400=    4403=    4406     4434=
                                          4459     4464     4489     4510=    4520
 4-0003BAC8  I*4  N2              COMM     467     1811=    1815     1816(2)= 1823     3404=
                                          3408     3409(2)= 3411     3776=    3779     3780(2)=
                                          3782     3896=    3898     3899(2)= 3904     3948=
                                          3959     4008     4257=    4260=    4264     4332=
                                          4335     4336(2)= 4338     4401=    4404=    4406
                                          4432=    4434     4435(2)= 4459     4464     4484=
                                          4489     4507=    4510     4511(2)= 4520

 4-0003BACC  I*4  N3              COMM     468     1671=    1680     1689     1700     1709
                                          1747=    1748     1817=    1818     1898=    1900
                                          1944=    1949     2077     2105     2134     2149
                                          2156     2161     2216     2544     2550     2561
                                          2567     2625     2632     2644     2655     2670
                                          2676     2692     2729     2761     2770     2778
                                          2786     2848     2856     2928     2976     3022
                                          3033     3122=    3126     3132     3147     3154
                                          3159     3167     3174     3179     3187     3219=
                                          3226     3229     3232     3235     3238     3241
                                          3244     3247     3256=    3258     3260     3265A
                                          3268     3270     3275A    3316     3321A    3322A
                                          3342     3347A    3348A    3387=    3389     3391
                                          3410=    3612=    3613     3618     3949=    3979
                                          4026     4054     4091     4114     4141     4189
                                          4190     4192     4228     4317     4337=    4347
                                          4389=    4390     4397=    4399     4408     4413=
                                          4418     4422     4438=    4444     4487=    4495
                                          4512=    4529     4562=    4563
 4-0003BAD0  I*4  N4              COMM     469     1673=    1945=    2087     2115     2135
                                          2146     2172     2217     2545     2551     2562
                                          2568     2626     2633     2645     2656     2671
                                          2677     2693     2719     2747     2807     2834
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                                              2876     2903     2916     2920     2929     2977
                                              3123=    3127     3144     3192     3220=    3225
                                              3228     3257=    3259     3262     3265A    3269
                                              3272     3275A    3303     3308A    3309A    3329
                                              3334A    3335A    3852=    3854     3950=    3961
                                              3982     4010     4029     4058     4094     4117
                                              4145     4152     4176     4191     4197     4206
                                              4229     4414=    4417     4439=    4451
 4-0003BAD4   I*4   N5               COMM      470     1675=    1720     1729     3185=    3188
                                              3221=    3231     3234     3301=    3302     3304
                                              3308A    3309A    3310     3314=    3315     3317
                                              3321A    3322A    3323     3853=    3857     3951=
                                              3964     3988     4013     4035     4064     4100
                                              4123     4157     4232     4415=    4421     4440=
                                              4454
 2-000CDC54   I*4   N6                        1674=    1724     1733     3124=    3133     3164
                                              3204     3222=    3327=    3328     3330     3334A
                                              3335A    3336     3340=    3341     3343     3347A
                                              3348A    3349     3628=    3629     3952=    3968
                                              4000     4017     4042     4069     4106     4129
                                              4161     4235
 2-000CDF88   I*4   N7                        3223=

 2-000CE280   I*4   N9                        4585=    4587
 5-0003118C   I*4   NAB              COMM      722
 5-00031190   I*4   NBA              COMM      723
 5-00031194   I*4   NCSM             COMM      724
 5-00031198   I*4   NCYCLE           COMM      725

13-00037ABC   I*4   NFMF             COMM     1208
14-00001CCC   I*4   NGR              COMM     1259
 5-00031214   I*4   NIC              COMM      730     4383     4404     4559
 5-00031218   I*4   NICL             COMM      731     4401     4403     4561
 5-0003121C   I*4   NINTS            COMM      732

 2-000CDE28   I*4   NN                        2704=    2707     2709     2712     2725(2)= 2727=
                                              2735     2737     2740     2752(2)= 2790=    2795
                                              2797     2800     2812(2)= 2814=    2816     2822
                                              2824     2827     2839(2)= 2860=    2864     2866
                                              2869     2881(2)= 2883=    2885     2891     2893
                                              2896     2908(2)= 3355=    3357     3359     3362
                                              3370(2)= 3372=    3374     3376     3379     3385(2)=
 5-00031278   I*4   NNSC             COMM      735
 8-00001518   I*4   NP               COMM      966
 5-0003129C   I*4   NS               COMM      740     1619     1650     1763     4642     4646
                                              4649     4652     4654     4656     4658     4660
                                              4662     4664     4666     4668     4670     4710
 5-000312B0   I*4   NSPT             COMM      743     3536     3900     3923     3941     4441
                                              4483     4495

 8-0000151C   I*4   NST              COMM      967
13-00037AD0   I*4   NTGEF            COMM     1211
 2-000CDE4C   I*4   NUMLIN                    2730=    2731     2817=    2818     2886=    2887
 2-000CDF30   I*4   NUMWEP                    3071=    3072     3074     3079(2)=
 2-000CDE38   I*4   NUMWPS                    2714=    2725     2742=    2752     2802=    2812
                                              2829=    2839     2871=    2881     2898=    2908
                                              3364=    3370     3381=    3385
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2-000CE278  I*4  NX                     4581=    4582     4592     4679=    4684     4691
                                        4697
2-000CE104  R*4  PCFR                   3866=    3867     3875=    3876     3888
2-000CE070  R*4  PEA                    3499=    3500(2)= 3517     3550     3555     3563
                                        3597
2-000CE074  R*4  PED                    3503=    3504(2)= 3518     3551     3556     3564
                                        3597
2-000CE1F0  R*4  PLSA                   4315=    4319(2)= 4324

2-000CE1EC  R*4  PLSG                   4314=    4318(2)= 4323
2-000CE1F4  R*4  PLSM                   4316=    4320(2)= 4325
2-000CE0C0  R*4  PPESE                  3775=    3795(2)= 3796     3802     3867     3876
2-000CE06C  R*4  PPS                    3496=    3497     3501     3562
2-000CDD28  R*4  PWIC                   2079=    2082=    2088     2089     2091     2092
                                        2096     2097     2100     2101     2107=    2110=
                                        2116     2117     2119     2120     2124     2125
                                        2128     2129

2-000CE250  R*4  RRR                    4466=    4467     4473     4474     4475
9-00009C21  CHAR RUNNAM        COMM     1034     1073
2-000CE090  R*4  SEF                    3525=    3544(2)= 3547     3548     3550     3551
                                        3554=    3571     3597     3781=    3788(2)= 3790(2)=
                                        3795
2-000CE284  R*4  SUM                    4586=    4588(2)= 4590     4591     4593
2-000CDD60  R*4  SUMA                   2147=    2152(2)= 2155     2157     3145=    3150(2)=
                                        3153     3155     3165=    3170(2)= 3173     3175

2-000CDD64  R*4  SUMD                   2148=    2153(2)= 2160     2162     3146=    3151(2)=
                                        3158     3160     3166=    3171(2)= 3178     3180
2-000CE0A8  R*4  TEMP                   3543=    3544     3821=    3822     3823     3824
                                        3827     3917=    3929     3953=    3972(2)= 3975
                                        3978     3983     3989     4001     4021(2)= 4023
                                        4025     4030     4036     4043     4272=    4283
                                        4284     4285     4290     4291     4292     4299=
                                        4300(2)= 4301     4302     4305     4306     4356=
                                        4357     4467=    4468     4472(2)  4538=    4539
                                        4543     4572=    4575=    4578=    4580     4583
2-000CE088  R*4  TEMP1                  3522=    3537(2)= 3570     3829=    3830     3831
                                        3833     3834     3929=    3931(2)= 3932     3933
                                        3934     4281=    4282     4283     4284     4285
                                        4288=    4289     4290     4291     4292     4357=
                                        4358(2)= 4364     4371     4373     4449=    4452(2)=
                                        4457     4474     4539=    4541     4545     4549
                                        4574=    4575(2)  4577=    4578(2)
2-000CE08C  R*4  TEMP2                  3523=    3539(2)= 3570(2)  3919=    3921=    3929
                                        4450=    4455(2)= 4457     4475
2-000CE114  R*4  TEMP3                  3925=    3927=    3929

2-000CE1E4  R*4  TEMPA                  4278=    4284=    4291=    4295(2)= 4297     4299
                                        4468=    4469     4472
2-000CE1E0  R*4  TEMPG                  4277=    4283=    4290=    4296     4299
2-000CE1E8  R*4  TEMPM                  4279=    4285=    4292=    4298     4299
2-000CE208  R*4  TEMPP                  4364=    4365     4366     4367     4368
2-000CE0BC  R*4  TMPFRD                 3677=    3680(2)= 3681     3687     3721=    3724(2)=
                                        3725     3731
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  2-000CE2EC  R*4  TOT                                   4695=   4696     4698
  2-000CE1AC  R*4  TSMSTK                                4178=   4180
  2-000CE244  R*4  TSS                                   4458=   4461(2)= 4463     4466
  2-000CE234  R*4  TT1                                   4442=   4448=    4473
  4-00041018  R*4  UBABAF                  COMM           521

  4-0004101C  R*4  UBABAR                  COMM           522
  4-00041020  R*4  UBABAZ                  COMM           523
  2-000CE0E8  R*4  VAFPA                                 3833=   3837(2)
  2-000CE0E0  R*4  VAFPD                                 3823=   3844(2)
  2-000CE0DC  R*4  VAI                                   3818=   3835=    3844

  2-000CE0D8  R*4  VDI                                   3817=   3825=    3837
  2-000CDC30  R*4  VFACTOR                               1077    3978=    4025=    4172A    4173A    4174A
                                                         4175A
  2-000CE0EC  R*4  VMFPA                                 3834=   3837(2)
  2-000CE0E4  R*4  VMFPD                                 3824=   3844(2)
  2-000CE078  R*4  WATS                                  3505=   3507=    3509     3565

  5-0004CD64  R*4  WDIVR                   COMM           824
  2-000CE07C  R*4  WDTS                                  3506=   3508=    3513     3566
  2-000CE080  R*4  WEA                                   3511=   3512(2)= 3517     3550     3555     3567
  2-000CE084  R*4  WED                                   3515=   3516(2)= 3518     3551     3556     3568
  2-000CE204  R*4  WPSOH                                 4350=   4352=    4354=    4356     4357     4532=
                                                         4534=   4536=    4538

  2-000CDCC8  R*4  WTFIT                                 1868=   1869
  2-000CE060  R*4  WTFITA                                3455=   3456(2)= 3459
  2-000CE064  R*4  WTFITD                                3457=   3458(2)= 3460
  2-000CE048  R*4  WVDACI                                3421=   3459(2)= 3476(2)= 3485(2)= 3582     3592
  2-000CE050  R*4  WVDAT                                 3423=   3442(2)= 3469(2)= 3507(2)  3572     3592

  2-000CE04C  R*4  WVDDCI                                3422=   3460(2)= 3478(2)= 3487(2)= 3585     3592
  2-000CE054  R*4  WVDDT                                 3424=   3443(2)= 3470(2)= 3508(2)  3573     3592
  2-000CDE48  R*4  XNLIN                                 2729=   2730     2816=    2817     2885=    2886

ARRAYS

    Address   Type  Name                   Attributes       Bytes  Dimensions       References

  4-00000004  R*4   AA                     COMM               100  (25)              341
  3-00000000  R*4   AAAAG                  COMM                 4  (1)               254
  5-00000000  R*4   AAABLK                 COMM                 4  (1)               540
  8-00000000  R*4   AAABLW                 COMM                 4  (1)               933
  6-00000000  R*4   AAABRS                 COMM                 4  (1)               854

  7-00000000  R*4   AAABSV                 COMM                 4  (1)               910
  9-00000000  CHAR  AAACH                  COMM                 4  (1)               987      1037
  9-00000004  CHAR  AAACT                  COMM                48  (3, 2, 2)         988      1038
 13-00000000  R*4   AAAGRD                 COMM                 4  (1)              1164
 14-00000000  R*4   AAAGRS                 COMM                 4  (1)              1255

  4-00000000  R*4   AAAGWK                 COMM                 4  (1)               340
 16-00000000  R*4   AAASUP                 COMM                 4  (1)              1292
 17-00000000  R*4   AAATC                  COMM                 4  (1)              1452
  5-00000004  R*4   AACDS                  COMM               240  (3, 10, 2)        541
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5-000000F4   R*4   AACS                          COMM        240  (3, 10, 2)       542

9-00000034   CHAR  AACT                          COMM        400  (25, 2, 2)       989      1039
9-000001C4   CHAR  AAFCT                         COMM         32  (2, 2, 2)        990      1040
9-000001E4   CHAR  AAFS                          COMM         64  (4, 2, 2)        991      1041
2-00000000   R*4   AAMA                                     5520  (30, 23, 2)     1552      3128=     3148=
                                                                  3155=     3193  3226

2-00001590   R*4   AAMD                                     5520  (30, 23, 2)     1552      3129=     3149=
                                                                  3160=     3196  3229

2-00002B20   R*4   AAMMA                                     736  (4, 23, 2)      1553      3134=     3168=
                                                                  3175=     3205  3238

2-00002E00   R*4   AAMMD                                     736  (4, 23, 2)      1553      3135=     3169=
                                                                  3180=     3208  3241

9-00000224   CHAR  AAMT                          COMM        480  (30, 2, 2)       992      1042
9-00000404   CHAR  AAST                          COMM         64  (4, 2, 2)        993      1043
2-000030E0   R*4   AAWA                                     4232  (23, 23, 2)     1554      2136=     2150=
                                                                  2157=     2252  2284      2556(2)=  2573(2)=
                                                                  2672      2720  2930

2-00004168   R*4   AAWD                                     4232  (23, 23, 2)     1554      2137=     2151=
                                                                  2162=     2254  2286      2557(2)=  2574(2)=
                                                                  2673      2748  2978

4-00000068   R*4   ABAAFA                        COMM       2000  (25, 10, 2)      342
4-00000838   R*4   ABAAFD                        COMM       2000  (25, 10, 2)      343
4-00001008   R*4   ABAARA                        COMM       2000  (25, 10, 2)      344
4-000017D8   R*4   ABAARD                        COMM       2000  (25, 10, 2)      345
4-00001FA8   R*4   ABAAZA                        COMM       2000  (25, 10, 2)      346

4-00002778   R*4   ABAAZD                        COMM       2000  (25, 10, 2)      347
4-00002F48   R*4   ABADFA                        COMM       2000  (25, 10, 2)      348
4-00003718   R*4   ABADFAWT                      COMM       2000  (25, 10, 2)      349
4-00003EE8   R*4   ABADFD                        COMM       2000  (25, 10, 2)      350
4-000046B8   R*4   ABADFDWT                      COMM       2000  (25, 10, 2)      351

4-00004E88   R*4   ABADFH                        COMM       2000  (25, 10, 2)      352
4-00005658   R*4   ABADFKWT                      COMM       2000  (25, 10, 2)      353
4-00005E28   R*4   ABADRA                        COMM       2000  (25, 10, 2)      354
4-000065F8   R*4   ABADRAWT                      COMM       2000  (25, 10, 2)      355
4-00006DC8   R*4   ABADRD                        COMM       2000  (25, 10, 2)      356

4-00007598   R*4   ABADRDWT                      COMM       2000  (25, 10, 2)      357
4-00007D68   R*4   ABADRH                        COMM       2000  (25, 10, 2)      358
4-00008538   R*4   ABADRKWT                      COMM       2000  (25, 10, 2)      359
4-00008D08   R*4   ABADZA                        COMM       2000  (25, 10, 2)      360
4-000094D8   R*4   ABADZAWT                      COMM       2000  (25, 10, 2)      361

4-00009CA8   R*4   ABADZD                        COMM       2000  (25, 10, 2)      362
4-0000A478   R*4   ABADZDWT                      COMM       2000  (25, 10, 2)      363
4-0000AC48   R*4   ABADZH                        COMM       2000  (25, 10, 2)      364
4-0000B418   R*4   ABADZKWT                      COMM       2000  (25, 10, 2)      365
4-0000BBE8   R*4   ABAEFA                        COMM       2000  (25, 10, 2)      366
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4-0000C3B8  R*4  ABAEFAWT   COMM  2000  (25, 10, 2)   367
4-0000CB88  R*4  ABAEFD     COMM  2000  (25, 10, 2)   368
4-0000D358  R*4  ABAEFDWT   COMM  2000  (25, 10, 2)   369
4-0000DB28  R*4  ABAEFH     COMM  2000  (25, 10, 2)   370
4-0000E2F8  R*4  ABAEFKWT   COMM  2000  (25, 10, 2)   371

4-0000EAC8  R*4  ABAERA     COMM  2000  (25, 10, 2)   372
4-0000F298  R*4  ABAERAWT   COMM  2000  (25, 10, 2)   373
4-0000FA68  R*4  ABAERD     COMM  2000  (25, 10, 2)   374
4-00010238  R*4  ABAERDWT   COMM  2000  (25, 10, 2)   375
4-00010A08  R*4  ABAERH     COMM  2000  (25, 10, 2)   376

4-000111D8  R*4  ABAERKWT   COMM  2000  (25, 10, 2)   377
4-000119A8  R*4  ABAEZA     COMM  2000  (25, 10, 2)   378
4-00012178  R*4  ABAEZAWT   COMM  2000  (25, 10, 2)   379
4-00012948  R*4  ABAEZD     COMM  2000  (25, 10, 2)   380
4-00013118  R*4  ABAEZDWT   COMM  2000  (25, 10, 2)   381

4-000138E8  R*4  ABAEZH     COMM  2000  (25, 10, 2)   382
4-000140B8  R*4  ABAEZKWT   COMM  2000  (25, 10, 2)   383
4-00014888  R*4  ABASFA     COMM  2000  (25, 10, 2)   384
4-00015058  R*4  ABASFD     COMM  2000  (25, 10, 2)   385
4-00015828  R*4  ABASRA     COMM  2000  (25, 10, 2)   386

4-00015FF8  R*4  ABASRD     COMM  2000  (25, 10, 2)   387
4-000167C8  R*4  ABASZA     COMM  2000  (25, 10, 2)   388
4-00016F98  R*4  ABASZD     COMM  2000  (25, 10, 2)   389
4-00017768  R*4  ABATEF     COMM    80  (10, 2)       390
4-000177B8  R*4  ABATER     COMM    80  (10, 2)       391

4-00017808  R*4  ABATEZ     COMM    80  (10, 2)       392
3-00000004  R*4  ABATPS     COMM   200  (25, 2)       255
3-000000CC  R*4  ABMTPS     COMM    48  (6, 2)        256
9-00000444  CHAR ABNAME     COMM  6160  (7, 220)      994   1044
9-00001C54  CHAR ACAPOD     COMM   480  (30, 2, 2)    995   1045

4-00017858  R*4  ACCZDC     COMM  2000  (25, 10, 2)   393
4-00018028  R*4  ACCZKC     COMM  2000  (25, 10, 2)   394
4-000187F8  R*4  ACCZT      COMM  2000  (25, 10, 2)   395
9-00001E34  CHAR ACDPCS     COMM   320  (20, 2, 2)    996   1046
9-00001F74  CHAR ACDPDS     COMM   320  (20, 2, 2)    997   1047

9-000020B4  CHAR ACFCT      COMM   240  (15, 2, 2)    998   1048
4-00018FC8  R*4  ACFSDC     COMM  2000  (25, 10, 2)   396
4-00019798  R*4  ACFSKC     COMM  2000  (25, 10, 2)   397
4-00019F68  R*4  ACFST      COMM  2000  (25, 10, 2)   398
9-000021A4  CHAR ACHAT      COMM    36  (9)           999   1049

9-000021C8  CHAR ACHDM      COMM    12  (3)          1000   1050
9-000021D4  CHAR ACISN      COMM   480  (30, 2, 2)   1001   1052
9-000023B4  CHAR ACPORT     COMM   160  (10, 2, 2)   1002   1051
4-0001A738  R*4  ACRSDC     COMM  2000  (25, 10, 2)   399
4-0001AF08  R*4  ACRSKC     COMM  2000  (25, 10, 2)   400

4-0001B6D8  R*4  ACRST      COMM  2000  (25, 10, 2)   401
8-00000004  R*4  ACSABA     COMM  2000  (25, 10, 2)   934   3614   3615
                                         3618   3965  3989   4014   4036
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                                                 4101       4124      4452      4588      4713
                                                 4718

  4-0001BEA8  R*4   AD              COMM      100  (25)                402
  9-00002454  CHAR  ADT             COMM      256  (32, 2)            1003      1053
  2-000CBC90  R*4   AERTA                    1840  (23, 10, 2)        1605
  2-000CC3C0  R*4   AERTD                    1840  (23, 10, 2)        1605
  9-00002554  CHAR  AGST            COMM       80  (5, 2, 2)          1004      1054

  9-000025A4  CHAR  AGWT            COMM       96  (12, 2)            1005      1055
  4-0001BF0C  R*4   AH              COMM      100  (25)                403
 16-00000004  R*4   AIFCT           COMM    24000  (10, 600)          1293
 16-00005DC4  R*4   AIRCAP          COMM      720  (30, 2, 3)         1294
 16-00006094  R*4   AIRPLE          COMM      480  (2, 30, 2)         1295

 16-00006274  R*4   AIRPRQ          COMM      240  (30, 2)            1296
  9-00002604  CHAR  AISM            COMM      320  (20, 2, 2)         1006      1056
  9-00002744  CHAR  AIWS            COMM       96  (3, 4, 2)          1007      1057
  4-0001BF70  R*4   AK              COMM      100  (25)                404
  2-000051F0  R*4   AKGS                     4600  (25, 23, 2)        1555      3989=     3996(2)=
                                                 3997       4036=     4038(2)= 4039      4065(2)=
                                                 4066       4101=     4103      4124=     4126
                                                 4158(2)=   4233      4422

  9-000027A4  CHAR  AKT             COMM       32  (4, 2)             1008      1058
  9-000027C4  CHAR  ALRS            COMM       32  (2, 2, 2)          1009      1059
  5-000001E4  R*4   ALRSF           COMM      160  (2, 10, 2)          543
  4-0001BFD4  R*4   ALRSFA          COMM       80  (2, 10)             405
  4-0001C024  R*4   ALRSFD          COMM       80  (2, 10)             406

  4-0001C074  R*4   ALRSFS          COMM       80  (2, 10)             407
  5-00000284  R*4   ALRSR           COMM      160  (2, 10, 2)          544
  4-0001C0C4  R*4   ALRSRA          COMM       80  (2, 10)             408
  4-0001C114  R*4   ALRSRD          COMM       80  (2, 10)             409
  4-0001C164  R*4   ALRSRS          COMM       80  (2, 10)             410

  5-00000324  R*4   ALRSZ           COMM      160  (2, 10, 2)          545
  4-0001C1B4  R*4   ALRSZA          COMM       80  (2, 10)             411
  4-0001C204  R*4   ALRSZD          COMM       80  (2, 10)             412
  4-0001C254  R*4   ALRSZS          COMM       80  (2, 10)             413
 16-00006364  R*4   ALTSPA          COMM     2400  (10, 2, 30)        1297

 16-00006CC4  R*4   ALTSPD          COMM     2400  (10, 2, 30)        1298
  4-0001C2A4  R*4   AMLFD           COMM     2000  (25, 10, 2)         414      3191
  6-00000004  R*4   AMNL            COMM    36000  (25, 30, 12)        855      3193      3196
                                                 4713       4718

  5-000003C4  R*4   AMNLAF          COMM     2400  (25, 12, 2)         546      3191
 17-00000004  R*4   AMOVR           COMM       16  (4)                1453
 17-00000014  R*4   AMTIAM          COMM      240  (30, 2)            1454      4718(2)=
 17-00000104  R*4   AMTINT          COMM     2000  (50, 10)           1455
  5-00000D24  R*4   AMTLRS          COMM       16  (2, 2)              547

  5-00000D34  R*4   AMTSRS          COMM       32  (4, 2)              548
  3-000000FC  R*4   AMXRPL          COMM        8  (2)                 257
  9-000027E4  CHAR  ANIWS           COMM      216  (3, 9, 2)          1010      1060
 16-00007624  R*4   APDARA          COMM     2400  (30, 10, 2)        1299
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16-00007F84  R*4  APDARV        COMM      2400  (30, 10, 2)       1300

 3-00000104  R*4  APDCAA        COMM      6000  (25, 30, 2)        258
 3-00001874  R*4  APDCAM        COMM      1440  (6, 30, 2)         259
 5-00000D54  R*4  APDDAM        COMM       240  (30, 2)            549
16-000088E4  R*4  APRLD         COMM      2400  (30, 10, 2)       1301
16-00009244  R*4  APRLDA        COMM      2400  (30, 10, 2)       1302

16-00009BA4  R*4  APSPD         COMM     24000  (100, 30, 2)      1303
 9-000028BC  CHAR APT           COMM        48  (6, 2)            1011    1061    2702
                                                2732

 3-00001E14  R*4  APTINT        COMM        80  (10, 2)            260
16-0000F964  R*4  APTTRK        COMM       480  (30, 2, 2)        1304
16-0000FB44  R*4  ARPCAP        COMM       720  (30, 2, 3)        1305
 9-000028EC  CHAR ASIDE         COMM         8  (2)               1012    1062    4649
16-0000FE14  R*4  ASL           COMM       480  (6, 10, 2)        1306

 9-000028F4  CHAR ASRS          COMM        64  (4, 2, 2)         1013    1063
 9-00002934  CHAR ASSM          COMM        96  (6, 2, 2)         1014    1064
 9-00002994  CHAR ASUT          COMM       112  (7, 2, 2)         1015    1065
 9-00002A04  CHAR ATR           COMM        16  (2, 2)            1016    1066
 5-00000E44  R*4  AVMPSM        COMM        48  (6, 2)             550

 9-00002A14  CHAR AWT           COMM       368  (23, 2, 2)        1017    1067    1981
                                                2715      2720    2743    2748    2761
                                                2770      2778    2786    2803    2808
                                                2830      2835    2848    2856    2872
                                                2877      2899    2904    3366    3383
                                                4189      4198

 5-00000E74  R*4  BALOC         COMM      6560  (4, 410)           551
17-000008D4  R*4  BAOFST        COMM        40  (10)              1456
 2-00019750  R*4  BAWASM                 42320  (23, 23, 20)      1583    2218=   2252=
                                                2553      2646    2761    2945

 2-00023CA0  R*4  BAWDSM                 42320  (23, 23, 20)      1583    2219=   2254=
                                                2554      2648    2770    2990

 2-000A1EB0  R*4  BBFRASM                42320  (23, 23, 20)      1602    2091=   2252
 2-000AC400  R*4  BBFRDSM                42320  (23, 23, 20)      1602    2092=   2254
 5-00002814  R*4  BCODE         COMM      2400  (600)              552
 5-00003174  R*4  BED           COMM      2400  (600)              553
13-00000004  R*4  BFRASM        COMM     42320  (23, 23, 20)      1165    2091

13-0000A554  R*4  BFRDSM        COMM     42320  (23, 23, 20)      1166    2092
 4-0001CA74  R*4  BMRSA         COMM        80  (2, 10)            415
 4-0001CAC4  R*4  BMRSD         COMM        80  (2, 10)            416
 4-0001CB14  R*4  BMRSS         COMM        80  (2, 10)            417
17-000008FC  R*4  BNDIS         COMM      2800  (70, 10)          1457

 5-00003AD4  R*4  BPD           COMM      2400  (600)              554    3496    3535
                                                3916      3917

13-00014AA4  R*4  BPKASM        COMM     42320  (23, 23, 20)      1167    2589
13-0001EFF4  R*4  BPKAW         COMM     12696  (23, 23, 6)       1168    2627
13-0002218C  R*4  BPKDSM        COMM     42320  (23, 23, 20)      1169    2592
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 13-0002C6DC  R*4  BPKDW                  COMM     12696  (23, 23, 6)       1170     2628
 13-0002F874  R*4  BSAWA                  COMM      6624  (23, 12, 6)       1171     1681(2)=  1690=
                                                     2088

 13-00031254  R*4  BSAWD                  COMM      6624  (23, 12, 6)       1172     1683(2)=  1691=
                                                     2089

  2-000A1B90  R*4  BSHTRA                             80  (20)              1597
  2-000A1BE0  R*4  BSHTRD                             80  (20)              1597
  4-0001CB64  R*4  BSSUPA                 COMM      2000  (25, 10, 2)        418
  4-0001D334  R*4  BSSUPD                 COMM      2000  (25, 10, 2)        419
  2-000A1D70  R*4  BSTRAS                             80  (20)              1600

  2-000A1DC0  R*4  BSTRDS                             80  (20)              1600
  2-000063E8  R*4  BSUM                             2300  (575)             1555     3261=     3265A
                                                     3271=       3275A      3305=    3308A     3318=
                                                     3321A       3331=      3334A    3344=     3347A

  2-0002E1F0  R*4  BSUMA                            4232  (23, 23, 2)       1584     2546=     2553(2)=
                                                     2556

  2-0002F278  R*4  BSUMD                            4232  (23, 23, 2)       1584     2547=     2554(2)=
                                                     2557

  5-00004434  R*4  BTD                    COMM      2400  (600)              555
  2-000A1C30  R*4  BTRGT                              80  (20)              1598
  2-00030300  R*4  BVWASM                          42320  (23, 23, 20)      1585     2222=     2589=
                                                     2646        2778

  2-0003A850  R*4  BVWDSM                          42320  (23, 23, 20)      1585     2223=     2592=
                                                     2648        2786

  5-00004D94  R*4  BWD                    COMM     55200  (23, 600)          556     3442      3443
                                                     3469        3470

  5-00012534  R*4  CADAM                  COMM       200  (25, 2)            557
  6-00008CA4  R*4  CAKNSF                 COMM       200  (25, 2)            856
  6-00008D6C  R*4  CAKNSR                 COMM       200  (25, 2)            857
  6-00008E34  R*4  CAKNSZ                 COMM       200  (25, 2)            858
  6-00008EFC  R*4  CAKSHF                 COMM       200  (25, 2)            859

  6-00008FC4  R*4  CAKSHR                 COMM       200  (25, 2)            860
  6-0000908C  R*4  CAKSHZ                 COMM       200  (25, 2)            861
 10-00000004  R*4  CAMCAS                 COMM     60000  (25, 30, 10, 2)   1085     4713(2)=
 10-0000EA64  R*4  CAMINT                 COMM     60000  (25, 30, 10, 2)   1086
 16-0000FFF4  R*4  CAPOD                  COMM       240  (30, 2)           1307

  3-00001E64  R*4  CAREPD                 COMM       200  (25, 2)            261
  6-00009154  R*4  CARLOS                 COMM        40  (10)               862
  4-0001DB04  R*4  CASAA                  COMM      2000  (25, 10, 2)        420
  4-0001E2D4  R*4  CASAD                  COMM      2000  (25, 10, 2)        421
  4-0001EAA4  R*4  CASDA                  COMM      2000  (25, 10, 2)        422

  4-0001F274  R*4  CASDAWT                COMM      2000  (25, 10, 2)        423
  4-0001FA44  R*4  CASDD                  COMM      2000  (25, 10, 2)        424
  4-00020214  R*4  CASDDWT                COMM      2000  (25, 10, 2)        425
  4-000209E4  R*4  CASDH                  COMM      2000  (25, 10, 2)        426
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 4-000211B4  R*4  CASDKWT        COMM     2000  (25, 10, 2)      427

 4-00021984  R*4  CASEA          COMM     2000  (25, 10, 2)      428
 4-00022154  R*4  CASEAWT        COMM     2000  (25, 10, 2)      429
 4-00022924  R*4  CASED          COMM     2000  (25, 10, 2)      430
 4-000230F4  R*4  CASEDWT        COMM     2000  (25, 10, 2)      431
 4-000238C4  R*4  CASEH          COMM     2000  (25, 10, 2)      432

 4-00024094  R*4  CASEKWT        COMM     2000  (25, 10, 2)      433
 4-00024864  R*4  CASSA          COMM     2000  (25, 10, 2)      434
 4-00025034  R*4  CASSD          COMM     2000  (25, 10, 2)      435
 3-00001F2C  R*4  CASSMM         COMM        8  (2)              262
 3-00001F34  R*4  CASSNM         COMM      240  (10, 3, 2)       263

 5-000125FC  R*4  CCAAPD         COMM      480  (2, 30, 2)       558
 5-000127DC  R*4  CCAPRT         COMM      160  (2, 10, 2)       559
 2-00006CE4  R*4  CDACS                     80  (10, 2)         1556     1907=     4580=
                                              4591(2)=  4690

 6-0000917C  R*4  CDVLOC         COMM     2400  (600)            863     1836      3428
                                              4270      4345    4527

 6-00009ADC  R*4  CFEBA          COMM       40  (10)             864
 5-0001287C  R*4  CKABSA         COMM      600  (25, 3, 2)       560
 5-00012AD4  R*4  CKABSM         COMM      144  (6, 3, 2)        561
17-000013EC  R*4  CKPINT         COMM     4000  (50, 10, 2)     1458
17-0000238C  R*4  CKPPHL         COMM      160  (2, 10, 2)      1459

 5-00012B64  R*4  CKSACA         COMM      600  (25, 3, 2)       562
 5-00012DBC  R*4  CKSACM         COMM      144  (6, 3, 2)        563
 5-00012E4C  R*4  CKUACA         COMM      600  (25, 3, 2)       564
 5-000130A4  R*4  CKUACM         COMM      144  (6, 3, 2)        565
 5-00013134  R*4  CLAHEA         COMM     3600  (15, 10, 6)      566

 5-00013F44  R*4  CLAHEC         COMM     3600  (15, 10, 6)      567
 5-00014D54  R*4  CLMHEA         COMM     3600  (15, 10, 6)      568
 5-00015B64  R*4  CLMHEC         COMM     3600  (15, 10, 6)      569
 5-00016974  R*4  CLRSDM         COMM       16  (2, 2)           570
 5-00016984  R*4  CLRSRP         COMM       16  (2, 2)           571

 5-00016994  R*4  CNCWLS         COMM      368  (23, 4)          572
16-000100E4  R*4  COPDHE         COMM      120  (15, 2)         1308
 5-00016B04  R*4  COPDIT         COMM      128  (32)             573
 5-00016B84  R*4  CPLAI          COMM      160  (10, 4)          574
 5-00016C24  R*4  CPLAIT         COMM      160  (10, 4)          575

 5-00016CC4  R*4  CPLARA         COMM      160  (10, 4)          576
 5-00016D64  R*4  CPLMI          COMM      160  (10, 4)          577
 5-00016E04  R*4  CPLMIT         COMM      160  (10, 4)          578
 5-00016EA4  R*4  CPLMRA         COMM      160  (10, 4)          579
 5-00016F44  R*4  CPLS           COMM      160  (10, 4)          580     4305(2)=  4366(2)=
                                              4383

 5-00016FE4  R*4  CQKNSF         COMM       40  (5, 2)           581
 5-0001700C  R*4  CQKNSR         COMM       40  (5, 2)           582
 5-00017034  R*4  CQKNSZ         COMM       40  (5, 2)           583
 5-0001705C  R*4  CQKSHF         COMM       40  (5, 2)           584
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 5-00017084  R*4  CQKSHR     COMM      40  (5, 2)          585

 5-000170AC  R*4  CQKSHZ     COMM      40  (5, 2)          586
 6-00009B04  R*4  CSABAF     COMM     200  (25, 2)         865
 6-00009BCC  R*4  CSABAR     COMM     200  (25, 2)         866
 6-00009C94  R*4  CSABAZ     COMM     200  (25, 2)         867
16-0001015C  I*4  CSACUS     COMM   48000  (3, 40, 100)   1309       1439

16-0001BCDC  R*4  CSAJSW     COMM       8  (2)            1310
16-0001BCE4  R*4  CSATRK     COMM     320  (20, 2, 2)     1311
 6-00009D5C  R*4  CSCASA     COMM     200  (25, 2)         868
13-00032C34  R*4  CSDAP      COMM    7680  (32, 6, 10)    1173       3927
 5-000170D4  R*4  CSDAW      COMM     160  (2, 10, 2)      587       4474(2)=

 5-00017174  R*4  CSDDP      COMM    7680  (32, 6, 10)     588       3925
 5-00018F74  R*4  CSDFS      COMM     320  (2, 10, 4)      589
 5-000190B4  R*4  CSDGW      COMM     160  (10, 4)         590       4473(2)=
 5-00019154  R*4  CSDR       COMM    2560  (2, 32, 10)     591       3929
 5-00019B54  R*4  CSDSW      COMM     160  (2, 10, 2)      592       4475(2)=

16-0001BE24  R*4  CSHE       COMM    4800  (30, 10, 4)    1312
 6-00009E24  R*4  CSINDA     COMM     200  (25, 2)         869
12-00000004  R*4  CSMENG     COMM    1600  (20, 10, 2)    1129       4207(2)=
 5-00019BF4  R*4  CSRSDM     COMM      32  (4, 2)          593
 5-00019C14  R*4  CSRSRP     COMM      32  (4, 2)          594

 5-00019C34  R*4  CSSMAR     COMM    6720  (6, 10, 28)     595       1656(2)=
 5-0001B674  R*4  CSSMST     COMM    6720  (6, 10, 28)     596       1655(2)=
 5-0001D0B4  R*4  CTSCA      COMM    8800  (10, 220)       597
 5-0001F314  R*4  CTSCD      COMM     320  (2, 10, 4)      598       3934(2)=
 6-00009EEC  R*4  CWLAI      COMM    3680  (23, 10, 4)     870

 6-0000AD4C  R*4  CWLAIT     COMM    3680  (23, 10, 4)     871
 6-0000BBAC  R*4  CWLARA     COMM    3680  (23, 10, 4)     872
 5-0001F454  R*4  CWLMI      COMM    3680  (23, 10, 4)     599
 5-000202B4  R*4  CWLMIT     COMM    3680  (23, 10, 4)     600
 5-00021114  R*4  CWLMRA     COMM    3680  (23, 10, 4)     601

 5-00021F74  R*4  CWLS       COMM    3680  (23, 10, 4)     602       4373(2)=  4408
 4-00025804  R*4  DA         COMM     100  (25)            436
 5-00022DD4  R*4  DABOCC     COMM       8  (2)             603
 2-00006D34  R*4  DAIR                 92  (23)           1556       3987=     3997(2)=
                                       4005       4034=   4039(2)=   4047      4062=
                                       4066(2)=   4073    4099=      4103(2)=  4111
                                       4122=      4126(2)= 4134      4160(2)=  4166
                                       4224A      4319

17-0000242C  R*4  DBDMF      COMM      80  (10, 2)        1460
 4-00025868  R*4  DD         COMM     100  (25)            437
13-00034A34  R*4  DDWDCD     COMM       8  (2)            1174
 5-00022DDC  R*4  DEPDR      COMM       8  (2)             604
13-00034A3C  R*4  DEQ        COMM     128  (32)           1175

 9-00002B84  CHAR DESC       COMM      20  (5)            1018       1068
 9-00002B98  CHAR DESIG      COMM   16800  (7, 600)       1030       1069
16-0001D0E4  R*4  DFACSA     COMM     160  (20, 2)        1313
16-0001D184  R*4  DFADSA     COMM     160  (20, 2)        1314
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 17-0000247C  R*4  DFASN          COMM        240  (30, 2)                 1461

 17-0000256C  R*4  DFBACT         COMM          8  (2)                     1462       1837(2)    3429(2)
                                                   4271(2)    4346(2)      4528(2)

  2-00006D90  R*4  DGRD                        92  (23)                    1557       3981=      3985(2)=
                                                   4005       4028=        4032(2)=   4047       4056=
                                                   4060(2)=   4073         4093=      4097(2)=   4111
                                                   4116=      4120(2)=     4134       4143       4144
                                                   4148(2)=   4155(2)=     4166       4225A      4318

  4-000258CC  R*4  DH             COMM        100  (25)                     438
 17-00002574  R*4  DIS2EC         COMM          8  (2)                     1463
 17-0000257C  R*4  DIS3EC         COMM          8  (2)                     1464
  4-00025930  R*4  DK             COMM        100  (25)                     439
 17-00002584  R*4  DLYMAX         COMM       4000  (50, 10, 2)             1465

 16-0001D224  R*4  DPCDS          COMM        160  (20, 2)                 1315
 16-0001D2C4  R*4  DPCSBA         COMM        160  (20, 2)                 1316
 16-0001D364  R*4  DPCSIS         COMM        160  (20, 2)                 1317
 16-0001D404  R*4  DPCSLN         COMM        320  (2, 20, 2)              1318
 16-0001D544  R*4  DPCSTF         COMM        160  (20, 2)                 1319

 16-0001D5E4  R*4  DPDDS          COMM        160  (20, 2)                 1320
 16-0001D684  R*4  DPDSBA         COMM        160  (20, 2)                 1321
 16-0001D724  R*4  DPDSIS         COMM        160  (20, 2)                 1322
 16-0001D7C4  R*4  DPDSLN         COMM        320  (2, 20, 2)              1323
 16-0001D904  R*4  DPDSTF         COMM        160  (20, 2)                 1324

 16-0001D9A4  R*4  DSA            COMM         80  (10, 2)                 1325
 16-0001D9F4  I*4  DSACUS         COMM      32000  (2, 40, 100)            1326       1440
 16-000256F4  R*4  DSAJSW         COMM          8  (2)                     1327
 16-000256FC  R*4  DSATRK         COMM        320  (20, 2, 2)              1328
 16-0002583C  R*4  DSD            COMM        320  (2, 10, 4)              1329

  2-00006DEC  R*4  DSHAR                     2400  (600)                   1557       3569=      3570=
                                                   4630

 16-0002597C  R*4  DSHE           COMM       1200  (10, 15, 2)             1330
 16-00025E2C  R*4  DSM            COMM        480  (6, 10, 2)              1331
  2-0000774C  R*4  DSSM                        92  (23)                    1558       3999=      4003(2)=
                                                   4005       4041=        4045(2)=   4047       4068=
                                                   4071(2)=   4073         4105=      4109(2)=   4111
                                                   4128=      4132(2)=     4134       4164(2)=   4166
                                                   4226A      4320

 16-0002600C  R*4  DSSP           COMM        320  (4, 10, 2)              1332
 17-00003524  R*4  DSTCKP         COMM       2000  (50, 10)                1466
 17-00003CF4  R*4  DSTPHL         COMM         16  (2, 2)                  1467
 17-00003D04  R*4  DSULT          COMM        896  (7, 32)                 1468
  5-00022DE4  R*4  DVASAM         COMM       4800  (2, 600)                 605

  5-000240A4  R*4  DVDPTH         COMM       1200  (300)                    606
  5-00024554  R*4  DVWDTH         COMM       1200  (300)                    607
  5-00024A04  R*4  EAACP          COMM       1200  (15, 10, 2)              608
  5-00024EB4  R*4  EAEAC          COMM       1200  (15, 10, 2)              609
 17-00004084  R*4  EAETE          COMM        120  (15, 2)                 1469
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 5-00025364  R*4  EAPAC                  COMM    1200  (15, 10, 2)       610
 5-00025814  R*4  EAPTE                  COMM     120  (15, 2)           611
 5-0002588C  R*4  EATAC                  COMM    1200  (15, 10, 2)       612
17-000040FC  R*4  EATTE                  COMM     120  (15, 2)          1470
 5-00025D3C  R*4  ECACP                  COMM    1200  (15, 10, 2)       613

 5-000261EC  R*4  ECEAC                  COMM    1200  (15, 10, 2)       614
17-00004174  R*4  ECETE                  COMM     120  (15, 2)          1471
 5-0002669C  R*4  ECPAC                  COMM    1200  (15, 10, 2)       615
 5-00026B4C  R*4  ECPTE                  COMM     120  (15, 2)           616
 5-00026BC4  R*4  ECTAC                  COMM    1200  (15, 10, 2)       617

17-000041EC  R*4  ECTTE                  COMM     120  (15, 2)          1472
 3-00002024  R*4  EDADPB                 COMM     240  (30, 2)           264
 3-00002114  R*4  EDADPT                 COMM     240  (30, 2)           265
 3-00002204  R*4  EDADVB                 COMM    5520  (30, 23, 2)       266
 3-00003794  R*4  EDADVH                 COMM   10800  (30, 15, 6)       267

 3-000061C4  R*4  EDADVT                 COMM    5520  (30, 23, 2)       268
 2-000077A8  R*4  EDAXSR                         2400  (600)            1558     3517=     3547
                                                        3592      3921

 2-00008108  R*4  EDDXSR                         2400  (600)            1559     3518=     3548
                                                        3592      3919

 3-00007754  R*4  EDMDVH                 COMM    1440  (4, 15, 6)        269
 3-00007CF4  R*4  EDSDPB                 COMM      32  (4, 2)            270
 3-00007D14  R*4  EDSDPT                 COMM      32  (4, 2)            271
 3-00007D34  R*4  EDSDVB                 COMM     736  (4, 23, 2)        272
 3-00008014  R*4  EDSDVT                 COMM     736  (4, 23, 2)        273

 2-000CB3F0  R*4  EERTA                          1104  (23, 6, 2)       1604     2173=     2589
                                                        2608      2627  2634     2930      2945
                                                        2962

 2-000CB840  R*4  EERTD                          1104  (23, 6, 2)       1604     2174=     2592
                                                        2611      2628  2635     2978      2990
                                                        3007

 6-0000CA0C  R*4  EFFDA                  COMM    2400  (600)             873     3547=     3550=
                                                        3555=  3559(2)= 3572     3592      4630

 6-0000D36C  R*4  EFFDD                  COMM    2400  (600)             874     3548=     3551=
                                                        3556=  3560(2)= 3573     3592      4630

 5-00027074  R*4  EFFHEA                 COMM    1200  (15, 10, 2)       618
 5-00027524  R*4  EFFHEC                 COMM    1200  (15, 10, 2)       619
16-0002614C  R*4  EIFCT                  COMM    2400  (600)            1333
17-00004264  R*4  ERDWLE                 COMM       8  (2)              1473
13-00034AC0  R*4  ERGMAX                 COMM     184  (23, 2)          1177     1884      1887
                                                        3471      3480  4349     4351      4531
                                                        4533

13-00034B78  R*4  ERTA                   COMM    1104  (23, 6, 2)       1178     2173
13-00034FC8  R*4  ERTD                   COMM    1104  (23, 6, 2)       1179     2174
 3-000082F4  R*4  ESDAMI                 COMM     480  (6, 10, 2)        274
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  3-000084D4  R*4  ESDASI                 COMM        2000  (25, 10, 2)        275
 10-0001D4C4  R*4  EXNPMN                 COMM        4232  (23, 23, 2)       1087      2930=     2931
                                                            2978=     2979    4172A

 15-00000004  R*4  EXPMN                  COMM      846400  (23, 23, 20, 10, 2)
                                                            1273      2945=   2947      2962=     2964
                                                            2990=     2992    3007=     3009      4174A
                                                            4192

  5-000279D4  R*4  FAACTD                 COMM         128  (32)               620
  4-00025994  R*4  FAADFF                 COMM        2000  (25, 10, 2)        440
  4-00026164  R*4  FAADRF                 COMM        2000  (25, 10, 2)        441
  4-00026934  R*4  FAADRR                 COMM        2000  (25, 10, 2)        442
  4-00027104  R*4  FAADZF                 COMM        2000  (25, 10, 2)        443

  4-000278D4  R*4  FAADZR                 COMM        2000  (25, 10, 2)        444
  4-000280A4  R*4  FAADZZ                 COMM        2000  (25, 10, 2)        445
  5-00027A54  R*4  FABDST                 COMM          80  (10, 2)            621
  4-00028874  R*4  FACDFC                 COMM       20000  (25, 10, 20)       446
  4-0002D694  R*4  FACDRC                 COMM       20000  (25, 10, 20)       447

  4-000324B4  R*4  FACDZC                 COMM       20000  (25, 10, 20)       448
  3-00008CA4  R*4  FACTRG                 COMM         600  (25, 3, 2)         276
  3-00008EFC  R*4  FAGSCN                 COMM         200  (25, 2)            277
 16-00026AAC  R*4  FAPCSA                 COMM           8  (2)               1334
 16-00026AB4  R*4  FAPDSA                 COMM           8  (2)               1335

  3-00008FC4  R*4  FAUSHL                 COMM           8  (2)                278
  3-00008FCC  R*4  FCAIA                  COMM         200  (25, 2)            279
 13-00035424  R*4  FCHP                   COMM           8  (2)               1183
 13-0003542C  R*4  FCVLS                  COMM           8  (2)               1184      3869      3878
  5-00027AA4  R*4  FDDPTH                 COMM           8  (2)                622

  4-000372D4  R*4  FDEAC                  COMM         100  (25)               449
  4-00037338  R*4  FDEAF                  COMM         100  (25)               450
  4-0003739C  R*4  FDEAR                  COMM         100  (25)               451
  4-00037400  R*4  FDEAZ                  COMM         100  (25)               452
  5-00027AAC  R*4  FDEFCP                 COMM        2400  (600)              623      3559      3560
                                                            4630

 13-00035434  R*4  FDMDC                  COMM           8  (2)               1185
 17-0000426C  R*4  FDVMST                 COMM        1280  (32, 10)          1474
 16-00026ABC  R*4  FDVVSH                 COMM        1200  (15, 10, 2)       1336
 17-0000476C  R*4  FDVVST                 COMM        1280  (32, 10)          1475      3544
 17-00004C6C  R*4  FEAFBA                 COMM           8  (2)               1476

  6-0000DCCC  R*4  FEBA                   COMM          40  (10)               875      1624      1626
                                                            1836      1923    3428      3743      4270
                                                            4345      4527

  5-0002840C  R*4  FEBATZ                 COMM          40  (10)               624      1624      1626
                                                            1923      3743

 10-0001E54C  R*4  FEBDLY                 COMM          80  (10, 2)           1088
 13-00035440  R*4  FEDW                   COMM           8  (2)               1187
  5-00028434  R*4  FEFFDG                 COMM        2400  (600)              625
 17-00004C74  R*4  FEISF                  COMM           8  (2)               1477
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 5-00028D94  R*4  FHEWTG             COMM        360  (3, 15, 2)        626

13-00035448  R*4  FICAS              COMM         16  (2, 2)           1188      3996      4038
                                                   4295

13-00035458  R*4  FMBP               COMM          8  (2)              1189
13-00035460  R*4  FMDPT              COMM       3072  (32, 6, 4)       1190
17-00004C7C  R*4  FMNC               COMM         80  (10, 2)          1478
17-00004CCC  R*4  FMOVR              COMM         16  (4)              1479
 5-00028EFC  R*4  FMXE               COMM          8  (2)               627

 5-00028F04  R*4  FMXEHE             COMM          8  (2)               628
13-00036060  R*4  FPCR               COMM         16  (4)              1191      4306      4368
16-00026F6C  R*4  FPCSCP             COMM         48  (6, 2)           1337
16-00026F9C  R*4  FPCSPC             COMM         40  (5, 2)           1338
 5-00028F0C  R*4  FPDCAS             COMM         80  (20)              629      4683=     4690(2)=
                                                   4696(2)=

16-00026FC4  R*4  FPDSCP             COMM         48  (6, 2)           1339
16-00026FF4  R*4  FPDSPC             COMM         40  (5, 2)           1340
 5-00028F5C  R*4  FPHEPC             COMM        600  (15, 5, 2)        630
13-00036070  R*4  FPKASM             COMM         24  (6)              1192      2589      2608
 8-000007D4  R*4  FPKC               COMM       2400  (600)             935

13-00036088  R*4  FPKDSM             COMM         24  (6)              1193      2592      2611
 3-00009094  R*4  FPKPOD             COMM          8  (2)               280
16-0002701C  R*4  FPPTCP             COMM         48  (6, 2)           1341
16-0002704C  R*4  FPPTPC             COMM         40  (5, 2)           1342
 5-000291B4  R*4  FPSWDU             COMM         56  (7, 2)            631

 3-0000909C  R*4  FQRA               COMM        120  (5, 3, 2)         281
17-00004CDC  R*4  FRACIO             COMM          8  (2)              1480
 7-00000004  R*4  FRAD               COMM         40  (10)              911      1909=     3096=
                                                   3107=      3283=    3294=     3660=     3663(2)=
                                                   3665       3675     3687=     3707=     3710(2)=
                                                   3711       3731=    3768

13-000360A0  R*4  FRATA              COMM         48  (6, 2)           1194      3665      3675
                                                   3711

13-000360D0  R*4  FRATD              COMM         48  (6, 2)           1195      3681      3725
 2-00008A68  R*4  FRCAR                           80  (10, 2)          1559      3879=     3880=
                                                   4666

 5-000291EC  R*4  FRDSUZ             COMM         64  (4, 2, 2)         632
 5-0002922C  R*4  FRHECT             COMM       2400  (4, 15, 10)       633
13-00036100  R*4  FRRINA             COMM         96  (6, 4)           1196      3025      3026
13-00036160  R*4  FRRING             COMM       3072  (32, 6, 4)       1197      1868      3455
                                                   3457

13-00036D60  R*4  FRRINH             COMM         96  (6, 4)           1198      3036      3037
17-00004CE4  R*4  FRRPHE             COMM        368  (2, 23, 2)       1481
16-00027074  R*4  FRSPGA             COMM        160  (2, 10, 2)       1343
16-00027114  R*4  FRSPTL             COMM        640  (10, 4, 4)       1344
16-00027394  R*4  FRSPTR             COMM        640  (10, 4, 4)       1345

 3-00009114  R*4  FSKPOD             COMM         80  (10, 2)           282
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  3-00009164  R*4   FSKSAK                  COMM        200  (25, 2)          283
  3-0000922C  R*4   FSKSMK                  COMM         48  (6, 2)           284
 17-00004E54  R*4   FSLOSS                  COMM         80  (10, 2)         1482
  3-0000925C  R*4   FSMTRG                  COMM        144  (6, 3, 2)        285

  5-00029B8C  R*4   FSSCAL                  COMM       3360  (6, 7, 20)       634
  5-0002A8AC  R*4   FSSKIF                  COMM        144  (6, 3, 2)        635     1649
  5-0002A93C  R*4   FSSMLK                  COMM        480  (6, 10, 2)       636
  3-000092EC  R*4   FTCWPL                  COMM        184  (23, 2)          286     4318      4319
                                                              4320      4364

 17-00004EA4  R*4   FTOSTR                  COMM         24  (3, 2)          1483
 17-00004EBC  R*4   FTOWTR                  COMM        552  (3, 23, 2)      1484
  5-0002AB1C  R*4   FWDCAS                  COMM       1840  (23, 20)         637     4685=     4692(2)=
                                                              4698(2)=

 11-00000000  R*4   GCHIM_STRT              COMM          4  (1)             1118
 12-00000000  R*4   GCRS_STRT               COMM          4  (1)             1128
 10-00000000  R*4   GC_STRT                 COMM          4  (1)             1084
  5-0002B24C  R*4   GDBA                    COMM       1600  (400)            638
  2-00008AB8  R*4   GKGS                               4232  (23, 23, 2)     1560     3983=     3985
                                                              4030=     4032     4059(2)= 4060      4095=
                                                              4097      4118=    4120     4146(2)=  4153(2)=
                                                              4230      4418

 15-00000000  R*4   GSV_STRT                COMM          4  (1)             1272
 17-000050E4  R*4   HECWRP                  COMM        736  (2, 23, 4)      1485
 16-00027614  R*4   HEMOVR                  COMM        120  (15, 2)         1346
  9-00006D38  CHAR  HEUDES                  COMM      12000  (600)           1031     1070
 17-000053C4  R*4   HEURPC                  COMM         16  (2, 2)          1486

 16-0002768C  R*4   HEUSPL                  COMM       2400  (600)           1347
 16-00027FEC  R*4   HEUSPS                  COMM       2400  (600)           1348
 16-0002894C  R*4   HEUTYP                  COMM       2400  (600)           1349
  3-000093A4  I*4   IABAAG                  COMM          8  (2)              287
  6-0000DCF4  I*4   IABAS                   COMM         40  (10)             876

 17-000053D4  I*4   IABASP                  COMM         40  (10)            1487
 13-00036DC0  I*4   IADJSH                  COMM       1600  (400)           1199
 13-00037400  I*4   IADJSL                  COMM       1600  (400)           1200
  6-0000DD1C  I*4   IBALD                   COMM       2400  (600)            877
  5-0002B88C  I*4   ICADTA                  COMM          8  (2)              639

  5-0002B894  I*4   ICADTD                  COMM          8  (2)              640
  5-0002B89C  I*4   ICBIT                   COMM       2400  (600)            641     3418      3906
                                                              4304      4344     4470     4526

  8-00001144  I*4   ICHTGAB                 COMM        880  (220)            940
 17-000053FC  I*4   ICKPNT                  COMM       6000  (50, 3, 10)     1488
 17-00006B6C  I*4   ICMES                   COMM         32  (4, 2)          1489
 17-00006B8C  I*4   ICMS                    COMM         80  (10, 2)         1490
 17-00006BDC  I*4   ICMST                   COMM         80  (10, 2)         1491     1767      3764(2)

 13-00037A40  I*4   ICPDHD                  COMM          8  (2)             1201     1622
 17-00006C2C  I*4   ICPDLY                  COMM       2400  (600)           1492
  5-0002C208  I*4   ICSA                    COMM         40  (10)             645     1621      1805
                                                              3115      3647     3704=    3735=     3746=
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17-0000758C  I*4  ICSMA              COMM        8  (2)              1493
 5-0002C234  I*4  ICSUPT             COMM       40  (5, 2)            647
17-00007594  I*4  ICTIM              COMM     2400  (600)            1494
17-00007EF4  I*4  ICTIMF             COMM     2400  (600)            1495
 6-0000E680  I*4  IDENTR             COMM     2400  (600)             879     4627

 6-0000EFE0  I*4  IDLABA             COMM    12000  (300, 10)         880     1827     3412
                                                  3783       3905    4265     4339     4460
                                                  4465       4490    4521

 6-00011EC0  I*4  IDLIBA             COMM    24000  (300, 10, 2)      881
 6-00017C80  I*4  IDTRAF             COMM    24000  (300, 10, 2)      882
 6-0001DA40  I*4  IDTRAR             COMM    24000  (300, 10, 2)      883
 6-00023800  I*4  IDTRNF             COMM    24000  (300, 10, 2)      884
 6-000295C0  I*4  IDTRNR             COMM    24000  (300, 10, 2)      885

 5-0002C264  I*4  IDWTSU             COMM      560  (5, 7, 4)         650
 5-0002C494  I*4  IEML               COMM      240  (10, 3, 2)        651
 5-0002C584  I*4  IESC               COMM      240  (10, 3, 2)        652
 5-0002C674  I*4  IFSMSK             COMM        8  (2)               653
 5-0002C67C  I*4  IFULL              COMM       80  (10, 2)           654

 2-00009B40  I*4  IHOLD                          8  (2)              1560     1765=    1774=
                                                  1785       3752    3753

17-00008854  I*4  IMUTMF             COMM        8  (2)              1496
 7-0000002C  R*4  INTDA              COMM     2000  (25, 10, 2)       912      926
 4-00037464  R*4  INTDAA             COMM     2000  (25, 10, 2)       453      527
 4-00037C34  R*4  INTDAD             COMM     2000  (25, 10, 2)       454      528
 7-000007FC  R*4  INTDE              COMM     2000  (25, 10, 2)       913      927

 4-00038404  R*4  INTDEA             COMM     2000  (25, 10, 2)       455      529
 4-00038BD4  I*4  INTDEAWT           COMM     2000  (25, 10, 2)       456
 4-000393A4  R*4  INTDED             COMM     2000  (25, 10, 2)       457      530
 4-00039B74  I*4  INTDEDWT           COMM     2000  (25, 10, 2)       458
 4-0003A344  R*4  INTDEH             COMM     2000  (25, 10, 2)       459      531

 4-0003AB14  I*4  INTDEKWT           COMM     2000  (25, 10, 2)       460
 7-00000FCC  R*4  INTDS              COMM     2000  (25, 10, 2)       914      928
 4-0003B2E4  R*4  INTDSD             COMM     2000  (25, 10, 2)       461      532
 3-000093AC  I*4  INTDSW             COMM        8  (2)               288
 6-0002F380  I*4  INTRVL             COMM       40  (10)              886

 3-000093B4  I*4  IOPCLS             COMM      880  (220)             289
 5-0002C6D0  I*4  IOSN               COMM      120  (30)              656
16-000292AC  I*4  IPASHE             COMM      480  (4, 15, 2)       1350
17-0000885C  I*4  IPASS              COMM      512  (4, 32)          1497
 5-0002C750  I*4  IPRDO              COMM      160  (40)              659

 5-0002C7F4  I*4  IPRSO              COMM      160  (40)              661
17-00008A5C  I*4  IPRTY              COMM     2400  (600)            1498
 5-0002C894  I*4  IPSHLA             COMM      200  (25, 2)           662
 3-00009724  I*4  IPSQRA             COMM       40  (5, 2)            290
 3-0000974C  I*4  IPTINT             COMM       80  (10, 2)           291

 5-0002C95C  I*4  IQRAP              COMM       40  (5, 2)            663
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  5-0002C984  I*4  IRAC                        COMM      600  (25, 3, 2)            664
  5-0002CBDC  I*4  IRADTA                      COMM        8  (2)                   665
  5-0002CBE4  I*4  IRADTD                      COMM        8  (2)                   666
 17-000093BC  I*4  IREPLC                      COMM     2400  (600)                1499

  3-0000979C  I*4  IRNCLS                      COMM      880  (220)                 292
  6-0002F3A8  I*4  ISA                         COMM       40  (10)                  887      1620      1768
                                                             1771      1803A      1922=     1923(2)=  2923A
                                                             3095=     3103=      3105=     3115=     3285=
                                                             3287=     3293=      3645A     3650=     3652=
                                                             3657=     3669=      3686=     3690=     3693=
                                                             3703=     3715=      3730=     3733=     3743
                                                             3745=     3752(2)=   3753(2)=  3757A     3764=
                                                             3770      3847       3924      4280      4646

 10-0001EF4C  I*4  ISAP                        COMM       40  (10)                 1091      1804      3758
                                                             3759=

  5-0002CBEC  I*4  ISCEF                       COMM       40  (10)                  667      3102      3284
                                                             3649      3665       3675

 10-0001EF78  I*4  ISECTOR_COLLAPSED           COMM       40  (10)                 1093
  3-00009B0C  I*4  ISHCLS                      COMM      880  (220)                 293
  6-0002F3D0  I*4  ISMA                        COMM       40  (10)                  888
 17-00009D1C  I*4  ISMAI                       COMM       80  (10, 2)              1500
  2-00044DA0  I*4  ISMFR                                3680  (23, 20, 2)          1586      1951=     1965=
                                                             2251      2283       2588      2607      2944
                                                             2961      2989       3006

 14-00000004  I*4  ISMT                        COMM     3680  (23, 20, 2)          1256      1960
 13-00037A50  I*4  ISMUS                       COMM        8  (2)                  1204      1954      1973
                                                             4184

 14-00000E64  I*4  ISMW                        COMM     3680  (23, 20, 2)          1257      1980      2241
                                                             2273      2585       2604      2760      2769
                                                             2777      2785       2847      2855      2941
                                                             2958      2986       3003

  5-0002CC18  I*4  ISNPRT                      COMM       80  (10, 2)               669
  5-0002CC68  I*4  ISSMLC                      COMM       48  (6, 2)                670
  5-0002CC98  I*4  ISSMNS                      COMM       48  (6, 2)                671
  5-0002CCC8  I*4  ISSMRG                      COMM       48  (6, 2)                672
  5-0002CD00  I*4  ITD                         COMM     2400  (600)                 675      1828      3413
                                                             3787      3907       4269      4343      4525
                                                             4628      4630

 17-00009D6C  I*4  ITRKAM                      COMM      240  (30, 2)              1501
 16-0002948C  I*4  IULAT                       COMM       32  (4, 2)               1351
 10-0001EEFC  I*4  IWDRAW                      COMM       80  (10, 2)              1090      1766=     1776=
                                                             1785

 10-0001EFA0  I*4  IWTIGT                      COMM     2208  (23, 12, 2)          1094      1962      2030
                                                             3074

 10-0001F840  I*4  IWTIWC                      COMM      736  (23, 4, 2)           1095      1866      1883
                                                             3024      3035       3437      3468
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13-00037A5C  I*4  IWUCE        COMM     92  (23)              1206     3062       3063
                                             3072      3086
15-000CEA44  I*4  IWUCES       COMM     40  (10)              1274     3088=      3090=
10-0001E59C  I*4  I_COMMIT     COMM   2400  (600)             1089
 5-0002D664  I*4  JCHIPP       COMM   2400  (600)              677
17-00009E5C  I*4  JRPWSW       COMM     16  (2, 2)            1502
17-00009E6C  I*4  JSHPSW       COMM      8  (2)               1503

17-00009E74  I*4  JSHWSW       COMM      8  (2)               1504
 5-0002DFCC  I*4  JSWHEU       COMM    160  (10, 2, 2)         680
17-00009E7C  I*4  KCEXTM       COMM      8  (2)               1505
 5-0002E06C  I*4  KCHAB        COMM     92  (23)               681
 5-0002E0C8  I*4  KCHSN        COMM     16  (4)                682

17-00009E84  I*4  KDVAT        COMM   2400  (600)             1506
17-0000A7E4  I*4  KDVMT        COMM   2400  (600)             1507
 5-0002E0D8  I*4  KNTARG       COMM    260  (65)               683
 5-0002E1E0  I*4  KPASA        COMM    160  (40)               685
 5-0002E280  I*4  KPASC        COMM    160  (40)               686

 5-0002E320  I*4  KPASG        COMM    160  (40)               687
 5-0002E3C0  I*4  KPASN        COMM    160  (40)               688
 5-0002E468  I*4  KPIS         COMM   2800  (70, 10)           691
 6-0002F3F8  I*4  KPS          COMM     40  (10)               889     1624(2)=   1626(2)=
                                             1805=     1810   2006     2009       2702
                                             2732      3097=  3295=    3405       3644
                                             3850

 5-0002EF58  I*4  KPSMA        COMM    160  (40)               692
 5-0002EFF8  I*4  KPSMAA       COMM    160  (40)               693
 5-0002F098  I*4  KPSMC        COMM    160  (40)               694
 5-0002F138  I*4  KPSMCA       COMM    160  (40)               695
 5-0002F1D8  I*4  KPSMG        COMM    160  (40)               696

 5-0002F278  I*4  KPSMGA       COMM    160  (40)               697     1634       1973
                                             2701      3353   3588     3502       4184
                                             4612      4641

 5-0002F318  I*4  KPSMI        COMM    320  (80)               698
 5-0002F458  I*4  KPSMN        COMM    160  (40)               699
 5-0002F4F8  I*4  KPSMNA       COMM    160  (40)               700
 5-0002F598  I*4  KPSMR        COMM    160  (40)               701
 5-0002F638  I*4  KPSUPT       COMM     60  (15)               702

 5-0002F674  I*4  KPSY         COMM     40  (10)               703
 5-0002F69C  I*4  KSSMA        COMM    160  (40)               704
 5-0002F73C  I*4  KSSMAA       COMM    160  (40)               705
 5-0002F7DC  I*4  KSSMC        COMM    160  (40)               706
 5-0002F87C  I*4  KSSMCA       COMM    160  (40)               707

 5-0002F91C  I*4  KSSMG        COMM    160  (40)               708
 5-0002F9BC  I*4  KSSMGA       COMM    160  (40)               709
 5-0002FA5C  I*4  KSSMI        COMM    320  (80)               710
 5-0002FB9C  I*4  KSSMN        COMM    160  (40)               711
 5-0002FC3C  I*4  KSSMNA       COMM    160  (40)               712
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  5-0002FCDC  I*4  KSSMR      COMM   160  (40)                  713
  6-0002F420  I*4  KTER       COMM    40  (10)                  890    1797
 17-0000B148  I*4  KTERIS     COMM  2800  (70, 10)             1509
  5-0002FD80  I*4  LNKHEU     COMM    80  (10, 2)               715
 16-000294AC  I*4  LNKSPT     COMM    80  (10, 2)              1352

  5-0002FDD0  I*4  LNKWPC     COMM   184  (23, 2)               716
  6-0002F448  I*4  LNKWPT     COMM   184  (23, 2)               891    2078    2106
                                         3069

  6-0002F500  I*4  MAD        COMM     8  (2)                   892
 17-0000BC3C  I*4  MBTLA      COMM    80  (2, 10)              1511
  5-0002FE88  I*4  MCDIV      COMM  4800  (600, 2)              717
  5-00031148  I*4  MFOPT      COMM     8  (2)                   718
  5-00031150  I*4  MNFCON     COMM    48  (6, 2)                719

 16-000294FC  R*4  MOVTRK     COMM     8  (2)                  1353    1444
 17-3000BC8C  I*4  MSW        COMM    80  (2, 10)              1512
  5-00031184  I*4  NAAC       COMM     8  (2)                   721
  6-0002F508  I*4  NAC        COMM     8  (2)                   893    3185    3221
                                         3301       3314       3387    3612    3951
                                         4415       4439       4585    4712

 16-00029504  I*4  NAEEFF     COMM    16  (4)                  1354
 16-00029514  I*4  NAEEFP     COMM    16  (4)                  1355
 16-00029524  I*4  NAEEFS     COMM    16  (4)                  1356
 16-00029534  I*4  NAEEFT     COMM    16  (4)                  1357
 14-00001CC4  I*4  NAM        COMM     8  (2)                  1258    1675    2095
                                         2123       3123       3220    4711

 16-00029544  I*4  NAPOD      COMM     8  (2)                  1358
  6-0002F510  I*4  ND         COMM     8  (2)                   894
  6-0002F518  I*4  NDIBA      COMM    80  (10, 2)               895
 16-0002954C  I*4  NDPCS      COMM     8  (2)                  1359
 16-00029554  I*4  NDPDS      COMM     8  (2)                  1360

  6-0002F568  I*4  NDS        COMM    80  (10, 2)               896    1816    1822
                                         3407       3409       3778    3780    3790
                                         3899       3903       4257    4259    4260(2)
                                         4263       4334       4336    4435    4436
                                         4486       4509       4511

  6-0002F5B8  I*4  NDTRAF     COMM    80  (10, 2)               897
  6-0002F608  I*4  NDTRAR     COMM    80  (10, 2)               898
  6-0002F658  I*4  NDTRNF     COMM    80  (10, 2)               899
  6-0002F6A8  I*4  NDTRNR     COMM    80  (10, 2)               900
  5-0003119C  I*4  NEAEF      COMM    16  (4)                   726    3498A

  5-000311AC  I*4  NEDEF      COMM    16  (4)                   727    3502A
  5-000311BC  I*4  NFCT       COMM     8  (2)                   728
 17-0000BCDC  I*4  NFRNTG     COMM     8  (2)                  1513
 16-0002955C  I*4  NHEEFF     COMM    16  (4)                  1361
 16-0002956C  I*4  NHEEFP     COMM    16  (4)                  1362

 16-0002957C  I*4  NHEEFS     COMM    16  (4)                  1363
 16-0002958C  I*4  NHEEFT     COMM    16  (4)                  1364
 14-00001CD0  I*4  NHSGR      COMM    12  (3)                  1260
```

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 5-000311C4  I*4  NHSR             COMM      80  (20)               729     4688
16-0002959C  I*4  NIFCT            COMM       8  (2)               1365

10-0001FB24  I*4  NLSGR            COMM      12  (3)               1097
 5-00031220  I*4  NLSR             COMM      80  (20)               733     4687
 5-00031270  I*4  NMM              COMM       8  (2)                734     1674     2099
                                               2127       3124     3222     3237     3240

 3-00009E7C  I*4  NOCCDU           COMM       8  (2)                294
 5-0003127C  I*4  NOCDPC           COMM       8  (2)                736
16-000295A4  I*4  NOCKPH           COMM     120  (15, 2)           1366
17-0000BCE4  I*4  NOCKPT           COMM     128  (32)              1514
17-0000BD64  I*4  NOCTCD           COMM       8  (2)               1515

 3-00009E84  I*4  NOPCLS           COMM       8  (2)                295
13-00037AC0  I*4  NPCAF            COMM       8  (2)               1209     3852     3865A
13-00037AC8  I*4  NPCDF            COMM       8  (2)               1210     3853     3874A
 5-00031284  I*4  NPORTS           COMM       8  (2)                737
 5-0003128C  I*4  NQRAT            COMM       8  (2)                738

 5-00031294  I*4  NR               COMM       8  (2)                739     4681
 3-00009E8C  I*4  NRNCLS           COMM       8  (2)                296
 5-000312A0  I*4  NSEFF            COMM       8  (2)                741     3542A
 3-00009E94  I*4  NSHCLS           COMM       8  (2)                297
14-00001CDC  I*4  NSM              COMM       8  (2)               1261     1950     1955
                                               1977       1989     2090     2118     2215
                                               2230       2262     2552     2569     2582
                                               2601       2643     2654     2680     2755
                                               2842       2915     2938     2955     2983
                                               3000       4177     4185     4205

 2-00045C00  I*4  NSMFR                     160  (20, 2)           1586     1956=    1964(2)=
                                               1965       2235     2250     2267     2282
                                               2583       2587     2602     2606     2939
                                               2943       2956     2960     2984     2988
                                               3001       3005

10-0001FB30  I*4  NSMT             COMM     160  (20, 2)           1098     1958     1959
10-0001FBD0  I*4  NSMW             COMM     160  (20, 2)           1099     1978     1979
                                               2235       2240     2267     2272     2583
                                               2584       2602     2603     2759     2768
                                               2776       2784     2846     2854     2939
                                               2940       2956     2957     2984     2985
                                               3001       3002

 5-000312A8  I*4  NSN              COMM       8  (2)                742
 5-000312B4  I*4  NSSM             COMM       8  (2)                744     1648     3201
                                               3223       3243     3246     3327     3340
                                               3393       3395     3628     3952     4440

 5-000312BC  I*4  NSU              COMM       8  (2)                745
 5-000312C4  R*4  NSUTD            COMM   16800  (7, 600)           746      844
 5-00035464  I*4  NT               COMM       8  (2)                747
 5-0003546C  R*4  NTSUDT           COMM     896  (7, 32)            748      845
 5-000357EC  I*4  NTWSU            COMM       8  (2)                749

17-0000BD6C  I*4  NUMCKP           COMM      40  (10)              1516
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  2-00009B48  I*4  NUMINC                        8  (2)            1561     1760=    3976(2)=
                                                    4024(2)=  4604

 13-00037AD4  I*4  NVERTA           COMM       184  (23, 2)        1212
 13-00037B8C  I*4  NVERTD           COMM       184  (23, 2)        1213
  5-000357F4  I*4  NW               COMM         8  (2)             750     1671     1673
                                                    1747      1817 1898     1944     1945
                                                    2704      2727 2790     2814     2860
                                                    2883      3086 3122     3219     3256
                                                    3257      3355 3372     3410     3948
                                                    3949      3950 4337     4389     4397
                                                    4413      4414 4438     4487     4512
                                                    4562      4581 4679

  5-000357FC  I*4  NWAEFF           COMM        16  (4)             751     3510A
  5-0003580C  I*4  NWDEFF           COMM        16  (4)             752     3514A
 10-0001FC70  I*4  NWTIGT           COMM        96  (12, 2)        1100     1961     2027
                                                    2029      3070 3072

 10-0001FCD0  I*4  NWTIWC           COMM        32  (4, 2)         1101     1865     1881
                                                    1882      3023 3034     3436     3466
                                                    3467

  5-0003581C  I*4  NZ               COMM         8  (2)             753
  6-0002F6F8  R*4  OCNUC            COMM       880  (220)           901
 17-0000BD94  R*4  OCWRP            COMM       736  (2, 23, 4)     1517
  3-00009E9C  R*4  OPCEQ            COMM       240  (30, 2)         298
  3-00009F8C  R*4  OPCEQM           COMM        32  (4, 2)          299

  5-00035824  R*4  PAACAM           COMM        72  (3, 3, 2)       754
  2-00009B50  R*4  PAAKW                      4600  (25, 23, 2)    1561     3189=    3193(2)=
                                                    3232      3305 3318     3965     3989
                                                    4101

  2-0000AD48  R*4  PADKW                      4600  (25, 23, 2)    1562     3190=    3196(2)=
                                                    3235      3306 3319     4014     4036
                                                    4124

 17-0000C074  R*4  PAFRAM           COMM        24  (3, 2)         1518
  3-00009FAC  R*4  PARKAB           COMM       880  (220)           300
  2-0000BF40  R*4  PCS                           8  (2)            1562     3867=    3868
                                                    3876=     3877 3881     3882     3890
                                                    4272

  2-0000BF48  R*4  PCSAR                        80  (10, 2)        1563     3881=    3882=
                                                    4668

  5-0003586C  R*4  PCSD             COMM      3840  (3, 32, 10)     755     3538
  3-0000A31C  R*4  PDANS            COMM       200  (25, 2)         301
  5-0003676C  R*4  PDAUT            COMM       120  (15, 2)         756
  5-000367E4  R*4  PDCUT            COMM       120  (15, 2)         757
  5-0003685C  R*4  PDDIA            COMM        16  (2, 2)          758

  5-0003686C  R*4  PDDRA            COMM         8  (2)             759
  5-00036874  R*4  PDDTA            COMM        24  (3, 2)          760
  5-0003688C  R*4  PDENS            COMM      1600  (400)           761
  6-0002FA68  R*4  PDIV             COMM      2400  (600)           902     3496     3917
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                                                                 4272       4273       4300      4301(2)=  4365(2)=
                                                                 4495

  3-0000A3E4  R*4  PDSHL                COMM          200  (25, 2)              302
  5-00036ECC  R*4  PDSSMS               COMM           48  (6, 2)               762
 16-0002961C  R*4  PDIF                 COMM           80  (10, 2)             1367
  2-0000BF98  R*4  PEAAR                             2400  (600)               1563      3563=     4630
  2-0000C8F8  R*4  PEDAR                             2400  (600)               1564      3564=     4630

  5-00036EFC  R*4  PEOTRK               COMM            8  (2)                  763
  3-0000A4AC  R*4  PEQDRP               COMM            8  (2)                  303
  8-00001520  R*4  PERDEG               COMM          480  (6, 10, 2)           968
  5-00036F04  R*4  PERDGL               COMM          480  (6, 10, 2)           764
  5-000370E4  R*4  PFASN                COMM           80  (10, 2)              765

  5-00037134  R*4  PHED                 COMM          120  (15, 2)              766
  5-000371AC  R*4  PIAIM                COMM         3400  (25, 17, 2)          767
  3-0000A4B4  R*4  PIAMM                COMM          288  (6, 6, 2)            304
  3-0000A5D4  R*4  PIAMMA               COMM         1200  (25, 6, 2)           305
  5-00037EF4  R*4  PIARP                COMM           16  (4)                  768      4303(2)=  4368(2)=

 16-0002966C  R*4  PIBA                 COMM           80  (10, 2)             1368
 17-0000C08C  R*4  PICVDR               COMM            8  (2)                 1519
 16-000296BC  R*4  PIFCT                COMM         2400  (600)               1369
  3-0000AA84  R*4  PKANSD               COMM          240  (30, 2)              306
  3-0000AB74  R*4  PKASD                COMM          960  (30, 4, 2)           307

  3-0000AF34  R*4  PKASSM               COMM         1200  (25, 6, 2)           308
  3-0000B3E4  R*4  PKMNSD               COMM           32  (4, 2)               309
  3-0000B404  R*4  PKMSD                COMM          128  (4, 4, 2)            310
  3-0000B484  R*4  PKMSSM               COMM          288  (6, 6, 2)            311
  2-0000D258  R*4  PLS                                 80  (10, 2)             1564      1906=     4262=
                                                           4302(2)=  4303      4367(2)=  4381      4580

 15-000CEA6C  R*4  PLST                 COMM            8  (2)                 1275      1746=     4303(2)=
  2-0000D2A8  R*4  PMAKW                             1104  (6, 23, 2)          1565      3202=     3205(2)=
                                                           3244      3331      3344      3969      4001
                                                           4107

  2-0000D6F8  R*4  PMDKW                             1104  (6, 23, 2)          1565      3203=     3208(2)=
                                                           3247      3332      3345      4018      4043
                                                           4130

  5-00037F04  R*4  PMILSN               COMM          120  (30)                 769
  5-00037F7C  R*4  PMLSSM               COMM          480  (6, 10, 2)           770
  2-0000DB48  R*4  PPESAR                              80  (10, 2)             1566      3796=     4664
  5-0003815C  R*4  PPRCRP               COMM           16  (4)                  771
  2-0000DB98  R*4  PPSAR                             2400  (600)               1566      3562=     4630

 16-0002A01C  R*4  PRIFCT               COMM          120  (15, 2)             1370
 17-0000C094  R*4  PRIPSH               COMM          160  (10, 4)             1520
 16-0002A094  R*4  PRISDD               COMM          480  (4, 15, 2)          1371
 17-0000C134  R*4  PRIWRP               COMM          736  (2, 23, 4)          1521
 17-0000C414  R*4  PRIWSH               COMM         3680  (23, 10, 4)         1522

 16-0002A274  R*4  PRPCAP               COMM          240  (10, 2, 3)          1372
 17-0000D274  R*4  PRPHE                COMM           16  (2, 2)              1523
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17-0000D284  R*4  PRPPSH    COMM      8  (2)             1524
16-0002A364  R*4  PRPSDC    COMM      8  (2)             1373
16-0002A36C  R*4  PRPSPD    COMM      8  (2)             1374

17-0000D28C  R*4  PRPWRP    COMM     16  (2, 2)          1525
17-0000D29C  R*4  PRPWSH    COMM      8  (2)             1526
16-0002A374  R*4  PRTARA    COMM    800  (10, 10, 2)     1375
16-0002A694  R*4  PRTARV    COMM    800  (10, 10, 2)     1376
3-0000B5A4   R*4  PRTCAA    COMM   2000  (25, 10, 2)      312

3-0000BD74   R*4  PRTCAM    COMM    480  (6, 10, 2)       313
5-0003816C   R*4  PRTCAP    COMM    240  (10, 2, 3)       772
5-0003825C   R*4  PRTCTN    COMM     80  (10, 2)          773
16-0002A9B4  I*4  PRTCUS    COMM  40000  (5, 20, 100)    1377     1441
3-0000BF54   R*4  PRTDAI    COMM    200  (25, 2)          314

5-000382AC   R*4  PRTDAM    COMM     80  (10, 2)          774
3-0000C01C   R*4  PRTDMI    COMM     48  (6, 2)           315
16-000345F4  R*4  PRTJSW    COMM      8  (2)             1378
5-000382FC   R*4  PRTPLE    COMM    160  (2, 10, 2)       775
16-000345FC  R*4  PRTPRQ    COMM    160  (10, 4)         1379

16-0003469C  R*4  PRTPSU    COMM      8  (2)             1380
17-0000D2A4  R*4  PRTRED    COMM     80  (10, 2)         1527
16-000346A4  R*4  PRTTRK    COMM    160  (10, 2, 2)      1381
16-00034744  R*4  PRUCSA    COMM    480  (20, 3, 2)      1382
16-00034924  R*4  PRUDSA    COMM    320  (20, 2, 2)      1383

16-00034A64  R*4  PRUPRT    COMM    400  (10, 5, 2)      1384
16-00034BF4  R*4  PRUSDN    COMM    960  (30, 4, 2)      1385
5-0003839C   R*4  PSRADS    COMM     56  (7, 2)           776
4-0003BAD8   R*4  PSRSCA    COMM    160  (4, 10)          471
4-0003BB78   R*4  PSRSCD    COMM     16  (4)              472

4-0003BB88   R*4  PSRSCS    COMM     16  (4)              473
4-0003BB98   R*4  PSRSFA    COMM    160  (4, 10)          474
4-0003BC38   R*4  PSRSFD    COMM    160  (4, 10)          475
4-0003BCD8   R*4  PSRSFS    COMM    160  (4, 10)          476
4-0003BD78   R*4  PSRSIA    COMM    160  (4, 10)          477

4-0003BE18   R*4  PSRSID    COMM     16  (4)              478
4-0003BE28   R*4  PSRSIS    COMM     16  (4)              479
4-0003BE38   R*4  PSRSRA    COMM    160  (4, 10)          480
4-0003BED8   R*4  PSRSRD    COMM    160  (4, 10)          481
4-0003BF78   R*4  PSRSRS    COMM    160  (4, 10)          482

4-0003C018   R*4  PSRSZA    COMM    160  (4, 10)          483
4-0003C0B8   R*4  PSRSZD    COMM    160  (4, 10)          484
4-0003C158   R*4  PSRSZS    COMM    160  (4, 10)          485
5-000383D4   R*4  PSZD      COMM    224  (7, 4, 2)        777
8-00001700   R*4  PSZDDS    COMM  33600  (7, 4, 300)      969

3-0000C04C   R*4  PTACWT    COMM    200  (25, 2)          316
3-0000C114   R*4  PTFRCA    COMM   6000  (25, 3, 20)      317
3-0000D884   R*4  PTFRCM    COMM   1440  (6, 3, 20)       318
16-00034FB4  R*4  PTIS      COMM     80  (10, 2)         1386
16-00035004  R*4  PTLTLN    COMM    160  (2, 10, 2)      1387
```

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 3-0000DE24  R*4  PTSMWT          COMM        48  (6, 2)            319
 2-00045CA0  R*4  PWAKSM                   84640  (23, 23, 20, 2)   1587       2646=      2657=
                                                  2681

 2-0000E4F8  R*4  PWAKW                     4232  (23, 23, 2)       1567       2672=      2694(2)=
                                                  2808       2877   3025(2)=   3036(2)=   3261
                                                  3273       3962   3983       4095

14-00001CE4  R*4  PWATS           COMM       736  (23, 4, 2)        1262       4539
 2-0005A740  R*4  PWDKSM                   84640  (23, 23, 20, 2)   1588       2648=      2659=
                                                  2683

 2-0000F580  R*4  PWDKW                     4232  (23, 23, 2)       1567       2673=      2695(2)=
                                                  2835       2904   3026(2)=   3037(2)=   3263
                                                  3271       4011   4030       4118

14-00001FC4  R*4  PWDRP           COMM      1104  (6, 23, 2)        1263       4541       4543
                                                  4545       4549

17-0000D2F4  R*4  PWNCTS          COMM       368  (23, 2, 2)        1528
17-0000D464  R*4  PWRCRP          COMM       736  (2, 23, 4)        1529
13-00037C44  R*4  PWSF            COMM       184  (23, 2)           1214       1678       1681
                                                  1683       1698   1701       1703       1719
                                                  1721       1722   1725       1726

 2-0006F1E0  R*4  PWSUMA                    4232  (23, 23, 2)       1589       2678=      2681(2)=
                                                  2694

 2-00070268  R*4  PWSUMD                    4232  (23, 23, 2)       1589       2679=      2683(2)=
                                                  2695

 5-000384B4  R*4  PZDPTH          COMM        32  (4, 2)            778
 5-000384D4  R*4  QRAAFT          COMM      4400  (5, 220)          779
17-0000D744  R*4  RAACM           COMM        72  (3, 3, 2)         1530
 5-00039604  R*4  RAAFRM          COMM        24  (3, 2)            780
 5-0003961C  R*4  RACAM           COMM       240  (10, 3, 2)        781

17-0000D78C  R*4  RACCZ           COMM        80  (10, 2)           1531
17-0000D7DC  R*4  RACFS           COMM        80  (10, 2)           1532
17-0000D82C  R*4  RACRS           COMM        80  (10, 2)           1533
 2-000712F0  R*4  RAWASM                   42320  (23, 23, 20)      1590       2220=      2284=
                                                  2570       2657   2848       2962

 2-0007B840  R*4  RAWDSM                   42320  (23, 23, 20)      1590       2221=      2286=
                                                  2571       2659   2856       3007

 3-0000DE54  R*4  RDOPPT          COMM         8  (2)               320
 5-0003970C  R*4  RDSUR           COMM        56  (7, 2)            782
16-000350A4  R*4  REPAVL          COMM      3680  (23, 10, 4)       1388
16-00035F04  R*4  REPCZ           COMM       368  (23, 4)           1389
16-00036074  R*4  REPSEC          COMM      3680  (23, 10, 4)       1390

16-00036ED4  R*4  REPWPN          COMM      3680  (23, 10, 4)       1391       4549(2)=
 5-00039744  R*4  RETRAN          COMM      2400  (600)             783
13-00037CFC  R*4  RFRASM          COMM     42320  (23, 23, 20)      1215       2119
13-0004224C  R*4  RFRDSM          COMM     42320  (23, 23, 20)      1216       2120
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 5-0003A0A4  R*4  RPAC             COMM        8  (2)                 784

16-00037D34  R*4  RPAVL            COMM      160  (10, 4)            1392
 5-0003A0AC  R*4  RPCZ             COMM       16  (4)                 785
 5-0003A0BC  R*4  RPEHE            COMM      120  (15, 2)             786
13-0004C79C  R*4  RPKASM           COMM    42320  (23, 23, 20)       1217     2608
13-00056CEC  R*4  RPKAW            COMM    12696  (23, 23, 6)        1218     2634

13-00059E84  R*4  RPKDSM           COMM    42320  (23. 23, 20)       1219     2611
13-000643D4  R*4  RPKDW            COMM    12696  (23, 23, 6)        1220     2635
17-0000D87C  R*4  RPPAB            COMM        8  (2)                1534
17-0000D884  R*4  RPPHE            COMM        8  (2)                1535
17-0000D88C  R*4  RPPSN            COMM        8  (2)                1536

17-0000D894  R*4  RPPSSM           COMM        8  (2)                1537
 5-0003A134  R*4  RPREHE           COMM      120  (15, 2)             787
17-0000D89C  R*4  RPRSSM           COMM        8  (2)                1538
 5-0003A1AC  R*4  RPRTRK           COMM        8  (2)                 788
 5-0003A1B4  R*4  RPSEC            COMM      160  (10, 4)             789

 5-0003A254  R*4  RPTRK            COMM        8  (2)                 790
17-0000D8A4  R*4  RPWHWC           COMM       16  (2, 2)             1539
 3-0000DE5C  R*4  RRAPL            COMM      200  (25, 2)             321
 2-000B6950  R*4  RRFRASM                  42320  (23, 23, 20)       1603     2119=     2284
 2-000C0EA0  R*4  RRFRDSM                  42320  (23, 23, 20)       1603     2120=     2286

 3-0000DF24  R*4  RRLSPL           COMM       16  (2, 2)              322
 3-0000DF34  R*4  RRSSPL           COMM       32  (4, 2)              323
13-0006756C  R*4  RSAWA            COMM     6624  (23, 12, 6)        1221     1701(2)=  1710=
                                                  2116

13-00068F4C  R*4  RSAWD            COMM     6624  (23, 12, 6)        1222     1703(2)=  1711=
                                                  2117

 2-000A1CD0  R*4  RSHTRA                      80  (20)               1599
 2-000A1D20  R*4  RSHTRD                      80  (20)               1599
 3-0000DF54  R*4  RSTCD            COMM        8  (2)                 324
 2-000A1E10  R*4  RSTRAS                      80  (20)               1601
 2-000A1E60  R*4  RSTRDS                      80  (20)               1601

 2-000CCAF0  R*4  RSTVA                     1840  (23, 10, 2)        1606
 2-000CD220  R*4  RSTVD                     1840  (23, 10, 2)        1606
 2-00010608  R*4  RSUM                      2300  (575)              1568     3263=     3265A
                                                  3273=     3275A    3306=    3309A     3319=
                                                  3322A     3332=    3335A    3345=     3348A

 2-00085D90  R*4  RSUMA                     4232  (23, 23, 2)        1591     2563=     2570(2)=
                                                  2573

 2-00086E18  R*4  RSUMD                     4232  (23, 23, 2)        1591     2564=     2571(2)=
                                                  2574

 2-000A1C80  R*4  RTRGT                       80  (20)               1598
17-0000D8B4  R*4  RUEPSP           COMM      184  (23, 2)            1540
17-0000D96C  R*4  RUEPWP           COMM      184  (23, 2)            1541
 2-00087EA0  R*4  RVWASM                   42320  (23, 23, 20)       1592     2224=     2608=
                                                  2657
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  2-000923F0  R*4  RVWDSM                       42320  (23, 23, 20)       1592      2225=     2611=
                                                       2659

  4-0003C1F8  R*4  SA               COMM          100  (25)                486
 12-00000644  R*4  SAAFSK           COMM         4000  (25, 2, 10, 2)     1130
 12-000015E4  R*4  SAARSK           COMM         4000  (25, 2, 10, 2)     1131
 12-00002584  R*4  SAAZSK           COMM         4000  (25, 2, 10, 2)     1132
  7-0000179C  R*4  SACZBK           COMM           80  (10, 2)             915

 12-00003524  R*4  SADFSK           COMM         4000  (25, 2, 10, 2)     1133
 12-000044C4  R*4  SADRSK           COMM         4000  (25, 2, 10, 2)     1134
 12-00005464  R*4  SADZSK           COMM         4000  (25, 2, 10, 2)     1135
 12-00006404  R*4  SAEFSK           COMM         4000  (25, 2, 10, 2)     1136
 12-000073A4  R*4  SAERSK           COMM         4000  (25, 2, 10, 2)     1137

 12-00008344  R*4  SAEZSK           COMM         4000  (25, 2, 10, 2)     1138
 12-000092E4  R*4  SAKGS            COMM        46000  (25, 23, 10, 2)    1139      4233(2)=
 13-0006A92C  R*4  SAMA             COMM         2880  (30, 12, 2)        1223      1721(2)=  1730=
                                                       2096      2124

 13-0006B46C  R*4  SAMD             COMM         2880  (30, 12, 2)        1224      1722(2)=  1731=
                                                       2097      2125

  5-0003A25C  R*4  SAMHEA           COMM        10800  (30, 15, 6)         791
  5-0003CCBC  R*4  SAMHEM           COMM         1440  (4, 15, 6)          792
  3-0000DF5C  R*4  SAMIA            COMM         5760  (30, 12, 4)         325
  3-0000F5DC  R*4  SAMIM            COMM          768  (4, 12, 4)          326
 13-0006BFAC  R*4  SAMMA            COMM          384  (4, 12, 2)         1225      1725(2)=  1734=
                                                       2100      2128

 13-0006C12C  R*4  SAMMD            COMM          384  (4, 12, 2)         1226      1726(2)=  1735=
                                                       2101      2129

 12-00014694  R*4  SASFSK           COMM         4000  (25, 2, 10, 2)     1140
 12-00015634  R*4  SASRSK           COMM         4000  (25, 2, 10, 2)     1141
 12-000165D4  R*4  SASZSK           COMM         4000  (25, 2, 10, 2)     1142
  2-0009C940  R*4  SAWA                          4232  (23, 23, 2)        1593      2088=     2116=
                                                       2136      2152     2157

  2-0009D9C8  R*4  SAWD                          4232  (23, 23, 2)        1593      2089=     2117=
                                                       2137      2153     2162

 12-00017574  R*4  SBSFSK           COMM         4000  (25, 2, 10, 2)     1143
 12-00018514  R*4  SCACSK           COMM         4000  (25, 2, 10, 2)     1144
 12-000194B4  R*4  SCASUAL          COMM          240  (3, 10, 2)         1145      4296(2)=  4297(2)=
                                                       4298(2)=  4323(2)= 4324(2)=  4325(2)=

 12-000195A4  R*4  SCDCSK           COMM         4000  (25, 2, 10, 2)     1146
 12-0001A544  R*4  SCECSK           COMM         4000  (25, 2, 10, 2)     1147
 12-0001B4E4  R*4  SCSCSK           COMM         4000  (25, 2, 10, 2)     1148
  4-0003C25C  R*4  SD               COMM          100  (25)                487
 16-00037DD4  R*4  SDDTF            COMM          240  (30, 2)            1393

  3-0000F8DC  R*4  SDFRDP           COMM           32  (4, 2)              327
 16-00037EC4  R*4  SDIS             COMM          240  (30, 2)            1394
  5-0003D22C  R*4  SDIV             COMM        24000  (600, 10)           793      3537      3540
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                                                  3931        3932(2)=  4461      4466      4468
                                                  4469(2)=    4495

16-00037FB4  I*4  SDNCUS        COMM     96000   (4, 60, 100)           1395      1442
16-0004F6B4  R*4  SDNJSW        COMM         8   (2)                    1396
16-0004F6BC  R*4  SDN RK        COMM       480   (30, 2, 2)             1397
 2-00010F04  R*4  SEFAR                   2400   (600)                  1569      3571=     3788
                                                  4630

10-00025AB0  R*4  SFAPP         COMM         8   (2)                    1108      1758      1761=
                                                  3975(2)=    4023(2)=  4600      4601=     4604(2)=
                                                  4607A

 2-00011864  R*4  SFAPPT                     8   (2)                    1569      1758=     1759(2)=
                                                  4601

 5-00042FEC  R*4  SFCAS         COMM        96   (6, 2, 2)               794      4101      4124
 5-0004304C  R*4  SFGND         COMM        96   (6, 2, 2)               795      4095      4118
 5-000430AC  R*4  SFIAHE        COMM        24   (3, 2)                  796
 5-000430C4  R*4  SFINT         COMM        16   (2, 2)                  797
13-0006C2AC  R*4  SFRFE         COMM        16   (2, 2)                 1227

 5-000430D4  R*4  SFSSM         COMM        96   (6, 2, 2)               798      4107      4130
12-0001C484  R*4  SGKGS         COMM     42320   (23, 23, 10, 2)        1149      4230(2)=
 4-0003C2C0  R*4  SH            COMM       100   (25)                    488
12-000269D4  R*4  SIAFSK        COMM      4000   (25, 2, 10, 2)         1150
10-0001FCF0  R*4  SIARSK        COMM      4000   (25, 2, 10, 2)         1102

10-00022BD0  R*4  SIAZSK        COMM      4000   (25, 2, 10, 2)         1105
16-0004F89C  R*4  SIBA          COMM       240   (30, 2)                1398
12-00027974  R*4  SIEFSK        COMM      4000   (25, 2, 10, 2)         1151
10-00020C90  R*4  SIERSK        COMM      4000   (25, 2, 10, 2)         1103
10-00023B70  R*4  SIEZSK        COMM      4000   (25, 2, 10, 2)         1106

16-0004F98C  R*4  SIFCT         COMM     24000   (10, 600)              1399
 8-00009A40  R*4  SINTDA        COMM      6000   (25, 10, 6)             970
12-00028914  R*4  SISFSK        COMM      4000   (25, 2, 10, 2)         1152
10-00021C30  R*4  SISRSK        COMM      4000   (25, 2, 10, 2)         1104
10-00024B10  R*4  SISZSK        COMM      4000   (25, 2, 10, 2)         1107

 4-0003C324  R*4  SK            COMM       100   (25)                    489
13-0006C2BC  R*4  SLSCAS        COMM      2000   (25, 10, 2)            1228      4452
13-0006CA8C  R*4  SLSSSM        COMM       480   (6, 10, 2)             1229      4455
16-0005574C  R*4  SLTSPA        COMM       800   (10, 2, 10)            1400
16-00055A6C  R*4  SLTSPD        COMM       800   (10, 2, 10)            1401

13-0006CC6C  R*4  SLWCB         COMM      1840   (23, 10, 2)            1230      4445
12-000298B4  R*4  SMENG         COMM     36800   (23, 20, 10, 2)        1153      2917=     2947(2)=
                                                  2964(2)=    2992(2)=  3009(2)=  4175A     4178
                                                  4198        4207

12-00032874  R*4  SMKGS         COMM     11640   (6, 23, 10, 2)         1154      4236(2)=
14-00002414  R*4  SMSTK         COMM      1600   (20, 10, 2)            1264      1957      1990
                                                  4178        4180=

 3-0000F8FC  R*4  SMXRPL        COMM         8   (2)                     328
 5-00043134  R*4  SNLTLN        COMM       480   (2, 30, 2)              799
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 16-00055D8C  R*4  SPRLD          COMM    800  (10, 10, 2)      1402
 16-000560AC  R*4  SPRLDA         COMM    800  (10, 10, 2)      1403
 16-000563CC  R*4  SQCSA          COMM    160  (20, 2)          1404

 16-0005646C  R*4  SQDSA          COMM    160  (20, 2)          1405
  5-00043314  R*4  SRRAC          COMM      8  (2)               800
  4-0003C388  R*4  SS             COMM    100  (25)              490
  2-0009EA50  R*4  SSAMA                 5520  (30, 23, 2)      1594      2096=      2124=
                                           3128        3150     3155

  2-0009FFE0  R*4  SSAMD                 5520  (30, 23, 2)      1594      2097=      2125=
                                           3129        3151     3160

  2-000A1570  R*4  SSAMMA                 736  (4, 23, 2)       1595      2100=      2128=
                                           3134        3170     3175

  2-000A1850  R*4  SSAMMD                 736  (4, 23, 2)       1595      2101=      2129=
                                           3135        3171     3180

 16-0005650C  R*4  SSDIS          COMM    240  (30, 2)          1406
  2-0001186C  R*4  SSMALO                 480  (6, 10, 2)       1570      1653=      1656
                                           1663A       3630     3631      3969       4001
                                           4018        4043     4107      4130       4455

  5-0004331C  R*4  SSMAMT         COMM    480  (6, 10, 2)        801
  8-0000B1B0  R*4  SSMCON         COMM    480  (6, 10, 2)        971      1651       1662A
  3-0000F904  R*4  SSMNLA         COMM    192  (4, 6, 2)         329
  5-000434FC  R*4  SSMNLI         COMM    192  (6, 4, 2)         802      3205       3208
  5-000435BC  R*4  SSMPIM         COMM    576  (6, 12, 2)        803      1651

  5-000437FC  R*4  SSMRDS         COMM     48  (6, 2)            804      1652(2)    1654(2)=
                                           1664A

 16-000565FC  R*4  SUAQUA         COMM   2400  (10, 30, 2)      1407
 16-00056F5C  R*4  SUAQUE         COMM   2400  (10, 30, 2)      1408
  4-0003C3EC  R*4  SUMM           COMM   2500  (625)             491
  4-0003CDB0  R*4  SUMM1          COMM   2500  (625)             492
  2-00011A4C  R*4  SUMMW                   92  (23)             1570      3960=      3962(2)=
                                           3965(2)=  3969(2)=   3972      4009=      4011(2)=
                                           4014(2)=  4018(2)=   4021

  5-0004382C  R*4  SUPASN         COMM   4800  (30, 10, 4)       805
 16-000578BC  R*4  SUPQUA         COMM    800  (10, 10, 2)      1409
 16-00057BDC  R*4  SUPQUE         COMM    800  (10, 10, 2)      1410
 16-00057EFC  R*4  SUPSD          COMM   2400  (10, 30, 2)      1411
 16-0005885C  R*4  SUPSDA         COMM   2400  (10, 30, 2)      1412

  4-0003D774  R*4  TA             COMM    100  (25)              493
  5-00044AEC  R*4  TAACND         COMM     24  (3, 2)            806
  4-0003D7D8  R*4  TABAAF         COMM    400  (25, 4)           494
  4-0003D968  R*4  TABAAR         COMM    400  (25, 4)           495
  4-0003DAF8  R*4  TABAAZ         COMM    400  (25, 4)           496

  4-0003DC88  R*4  TABAEF         COMM    400  (25, 4)           497
  4-0003DE18  R*4  TABAER         COMM    400  (25, 4)           498
  4-0003DFA8  R*4  TABAEZ         COMM    400  (25, 4)           499
  4-0003E138  R*4  TABASF         COMM    400  (25, 4)           500
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  4-0003E2C8  R*4  TABASR          COMM       400  (25, 4)         501

  4-0003E458  R*4  TABASZ          COMM       400  (25, 4)         502
  5-00044B04  R*4  TADSRA          COMM        56  (7, 2)          807
  5-00044B3C  R*4  TADTHE          COMM         8  (2)             808
  5-00044B44  R*4  TADTSZ          COMM        32  (4, 2)          809
  5-00044B64  R*4  TAESRA          COMM        56  (7, 2)          810

  8-0000B390  R*4  TAESZD          COMM     33600  (7, 4, 300)     972
  5-00044B9C  R*4  TASEHE          COMM         8  (2)             811
  5-00044BA4  R*4  TASESZ          COMM        32  (4, 2)          812
  4-0003E5E8  R*4  TBSSUP          COMM       400  (25, 4)         503
  4-0003E778  R*4  TCASA           COMM       400  (25, 4)         504

  4-0003E908  R*4  TCASD           COMM       400  (25, 4)         505
  4-0003EA98  R*4  TCASE           COMM       400  (25, 4)         506
  4-0003EC28  R*4  TCASS           COMM       400  (25, 4)         507
  5-00044BC4  R*4  TCDCUM          COMM      9600  (4, 600)        813
  6-000303C8  R*4  TCDCUR          COMM      9600  (4, 600)        903

  3-0000F9C4  R*4  TCDEQ           COMM       240  (30, 2)         330
  3-0000FAB4  R*4  TCDEQM          COMM        32  (4, 2)          331
  5-00047144  R*4  TDIV            COMM      2400  (600)           814
 12-00035394  R*4  TEXNPM          COMM      1840  (23, 10, 2)    1155      2921=      2931(2)=
                                                 2979(2)=  4173A

 16-000591BC  R*4  TIFCT           COMM      2400  (600)          1413
  4-0003EDB8  R*4  TINTDAF         COMM       400  (25, 4)         508
  4-0003F268  R*4  TINTDAR         COMM       400  (25, 4)         511
  4-0003F718  R*4  TINTDAZ         COMM       400  (25, 4)         514
  4-0003EF48  R*4  TINTDEF         COMM       400  (25, 4)         509

  4-0003F3F8  R*4  TINTDER         COMM       400  (25, 4)         512
  4-0003F8A8  R*4  TINTDEZ         COMM       400  (25, 4)         515
  4-0003F0D8  R*4  TINTDSF         COMM       400  (25, 4)         510
  4-0003F588  R*4  TINTDSR         COMM       400  (25, 4)         513
  4-0003FA38  R*4  TINTDSZ         COMM       400  (25, 4)         516

  4-0003FBC8  R*4  TJOR            COMM       100  (25)            517
  7-000017EC  R*4  TLRSSC          COMM        16  (2, 2)          916
  7-000017FC  R*4  TMRSSC          COMM        16  (2, 2)          917
 13-0006D39C  R*4  TNGDIV          COMM      2400  (600)          1231
 14-00002A54  R*4  TNGMOD          COMM      2400  (600)          1265      3500       3504
                                                 3512      3516

  2-000A1B30  R*4  TNWIGT                      96  (12, 2)        1596      2028=      2031(2)=
                                                 2081      2082   2109      2110

  5-00047AA4  R*4  TPD             COMM       128  (32)            815      3535       3916
 15-000CEA74  R*4  TPDIV           COMM         8  (2)            1276      1745=      4273(2)=
  5-00047B24  R*4  TPSUTD          COMM       896  (7, 32)         816
 16-00059B1C  R*4  TRKCAP          COMM        24  (3, 2)         1414
 16-00059B34  R*4  TRKMVR          COMM         8  (2)            1415

 17-0000DA24  R*4  TRKRDC          COMM         8  (2)            1542
  4-0003FC2C  R*4  TS              COMM       100  (25)            518
  2-00011AA8  R*4  TSC                         80  (10, 2)        1571      3901=      3933(2)=
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                                                   3941

 2-00011AF8  R*4  TSL                       800  (10, 10, 2)      1571       4443=      4445(2)=
                                                 4448    4457(2)= 4467       4483

 7-0000180C  R*4  TSRSSC        COMM         32  (4, 2)            918
 8-000136D0  R*4  TSSMSF        COMM        480  (6, 10, 2)        973
 5-00047EA4  R*4  TTD           COMM        128  (32)              817
 4-0003FC90  R*4  TUMM          COMM       2500  (625)             519
 4-00040654  R*4  TUMM1         COMM       2500  (625)             520

 5-00047F24  R*4  TWD           COMM       2944  (23, 32)          818       1868       3455
                                                 3457

 2-00011E18  R*4  TWS                         8  (2)              1572       1899=      1901(2)=
                                                 1918(2)  1920    1930(2)

 5-00048AA4  R*4  TWSUTD        COMM       4480  (5, 7, 32)        819
 2-00011E20  R*4  TYPCAF                     32  (8)              1572       3855=      3865A
 2-00011E40  R*4  TYPCDF                     32  (8)              1573       3858=      3874A
17-0000DA2C  R*4  UMOVR         COMM        128  (32)             1543
 7-0000182C  R*4  VAABA         COMM         80  (10, 2)           919       1915=      1926=
                                                 3610=   3614(2)= 3637       3660       3677
                                                 3707    3721     3827       3831       3833
                                                 4288    4291     4574       4575       4656

 7-0000187C  R*4  VADBA         COMM         80  (10, 2)           920       1916=      3611=
                                                 3615(2)= 3637    3648       3655       3660
                                                 3677    3701     3707       3721       3821
                                                 3823    3829     4281       4284       4577
                                                 4578    4658

13-0006DCFC  R*4  VAMAW         COMM       5520  (30, 23, 2)      1232       3193
13-0006F28C  R*4  VAMDW         COMM       5520  (30, 23, 2)      1233       3196
 5-00049C24  R*4  VAMHEA        COMM      10800  (30, 15, 6)       820
 5-0004C654  R*4  VAMHEM        COMM       1440  (4, 15, 6)        821
 3-0000FAD4  R*4  VAMIA         COMM      11040  (30, 23, 4)       332

 3-000125F4  R*4  VAMIM         COMM       1472  (4, 23, 4)        333
 2-00011E60  R*4  VDAC                     2400  (600)            1573       3572=      3574
                                                 3583    3592     4630

 2-000127C0  R*4  VDDC                     2400  (600)            1574       3573=      3575
                                                 3586    3592     4630

 7-000018CC  R*4  VGABA         COMM         80  (10, 2)           921       1911=      1925=
                                                 3574(2)= 3604    3835(2)    3868       4652

 2-00013120  R*4  VGABAI                     80  (10, 2)          1574       1913=      1927=
                                                 3583(2)= 3660    3677       3707       3721
                                                 3827    3831     3835       4288       4290
                                                 4574

 7-0000191C  R*4  VGDBA         COMM         80  (10, 2)           922       1912=      3575(2)=
                                                 3604    3825(2)  3877       4654

 2-00013170  R*4  VGDBAI                     80  (10, 2)          1575       1914=      1928=
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                                                        3586(2)=  3648      3655      3660      3677
                                                        3701      3707      3721      3821      3825
                                                        3829      4281      4283      4577

15-000CEA7C  R*4  VIAACF             COMM        2000  (25, 10, 2)          1277      3308A     3311(2)=
                                                        3321A     3324(2)=  3389      3614

15-000CF24C  R*4  VIADCF             COMM        2000  (25, 10, 2)          1278      3309A     3312(2)=
                                                        3322A     3325(2)=  3391      3615

15-000CFA1C  R*4  VIMACF             COMM         480  (6, 10, 2)           1279      3334A     3337(2)=
                                                        3347A     3350(2)=  3393      3630

15-000CFBFC  R*4  VIMDCF             COMM         480  (6, 10, 2)           1280      3335A     3338(2)=
                                                        3348A     3351(2)=  3395      3631

10-00025AB8  R*4  VIWACF             COMM        1840  (23, 10, 2)          1109      3265A     3275(2)A
                                                        3309A     3322A     3335A     3348A     3368
                                                        3438      3442      3459      3469      3472
                                                        3476      3481      3485      4021

 5-0004CBF4  R*4  VIWASF             COMM         184  (23, 2)               822      3265A
 2-000131C8  R*4  VIWAW                          4232  (23, 23, 2)          1576      2627=     2634=
                                                        2672

10-000261E8  R*4  VIWDCF             COMM        1840  (23, 10, 2)          1110      3265A     3275A
                                                        3308A     3321A     3334A     3347A     3384
                                                        3440      3443      3460      3470      3474
                                                        3478      3483      3487      3972

 5-0004CCAC  R*4  VIWDSF             COMM         184  (23, 2)               823
 2-000;1250  R*4  VIWDW                          4232  (23, 23, 2)          1576      2628=     2635=
                                                        2673

 2-000131C0  R*4  VLS                               8  (2)                  1575      3868=     3869(2)=
                                                        3877=     3878(2)=  3883      3884      3890
                                                        3975      3978      3983      3989      4001
                                                        4023      4025      4030      4036      4043

15-000CFDDC  R*4  VLSAR              COMM          80  (10, 2)              1281      3883=     3884=
                                                        4670

 7-0000196C  R*4  VMABA              COMM          80  (10, 2)               923      3626=     3630(2)=
                                                        3639      3660      3677      3707      3721
                                                        3827      3831      3834      4288      4292
                                                        4574      4660

 7-000019BC  R*4  VMDBA              COMM          80  (10, 2)               924      3627=     3631(2)=
                                                        3639      3648      3655      3660      3677
                                                        3701      3707      3721      3821      3824
                                                        3829      4281      4285      4577      4662

13-0007081C  R*4  VMMAW              COMM         736  (4, 23, 2)           1234      3205
13-00070AFC  R*4  VMMDW              COMM         736  (4, 23, 2)           1235      3208
 2-000152D8  R*4  WATSAR                         2400  (600)                1577      3565=     4630
 6-00032948  R*4  WDIV               COMM       55200  (23, 600)             904      1867      1869
                                                        1885      1886      1888      1889      3438
```

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                                                        3440      3456      3458      3472      3474
                                                        3476      3478      3481      3483      3485
                                                        3487      4350      4352      4371(2)=  4372(2)=
                                                        4495      4532      4534      4545(2)=

 5-0004CD68  R*4  WDRRP           COMM          368  (23, 4)             825       4543(2)=  4563
 5-0004CED8  R*4  WDRRPC          COMM         3680  (23, 10, 4)         826       4541(2)=
 2-00015C38  R*4  WDTSAR                       2400  (600)              1578       3566=     4630
 2-00016598  R*4  WEAAR                        2400  (600)              1578       3567=     4630
 2-00016EF8  R*4  WEDAR                        2400  (600)              1579       3568=     4630

 5-0004DD38  R*4  WIDDR           COMM            8  (2)                 827
 6-000400E8  R*4  WIDS            COMM           40  (10)                905
 4-00041024  R*4  WIDST           COMM           40  (10)                524
 2-00017858  R*4  WLDAS                        1840  (23, 10, 2)        1579       1903=     4583=
                                                      4593(2)=  4692

11-00000004  R*4  WLS             COMM         1840  (23, 10, 2)        1119       1902=     3980=
                                                      4005=     4027=     4047=     4055      4057
                                                      4063      4073=     4092=     4111=     4115=
                                                      4134=     4142      4151      4156      4166=
                                                      4356      4391      4399      4538      4583

15-000CFE2C  R*4  WLST            COMM          184  (23, 2)            1282       1749=     4391(2)=
16-00059B3C  R*4  WPFCT           COMM        55200  (600, 23)          1416
 8-000138B0  R*4  WPNK            COMM          160  (2, 10, 2)          974
16-000672DC  R*4  WRPAVL          COMM         3680  (23, 10, 4)        1417
 5-0004DD40  R*4  WRPCZ           COMM          368  (23, 4)             828

16-0006813C  R*4  WRPSEC          COMM         3680  (23, 10, 4)        1418
 2-00017F88  R*4  WS                            184  (23, 2)            1580       1819=     1867(2)=
                                                      1885(2)=  1888(2)=  1901      1904      3150
                                                      3151      3155      3160      3170      3171
                                                      3175      3180      4055      4063      4142
                                                      4156      4348      4356      4530      4538

 2-000CD950  R*4  WSGWVA                        184  (23, 2)            1607
 2-000CDA08  R*4  WSGWVD                        184  (23, 2)            1607
11-00000734  R*4  WSI             COMM         1840  (23, 10, 2)        1120       1820=     1869(2)=
                                                      1886(2)=  1889(2)=  1963      1981      2031
                                                      2082      2110      2152      2153      2157
                                                      2162      2245      2277      2586      2605
                                                      2942      2959      2987      3004      3064
                                                      3075      3089      3962      3983      4011
                                                      4030      4057      4095      4118      4143
                                                      4144      4151      4178      4207      4445

15-000CFEE4  R*4  WST             COMM          184  (23, 2)            1283       1750=     1904(2)=
16-00068F9C  R*4  WTAGCS          COMM           16  (2, 2)             1419
16-00068FAC  R*4  WTAGDS          COMM           16  (2, 2)             1420
 5-0004DEB0  R*4  WTDCTR          COMM          768  (32, 3, 2)          829
 2-000CDAC0  R*4  WTGWVA                        184  (23, 2)            1608

 2-000CDB78  R*4  WTGWVD                        184  (23, 2)            1608
16-00068FBC  R*4  WTHETR          COMM          360  (15, 3, 2)         1421
 2-00018040  R*4  WVDAC                        2400  (600)              1580       3419=     3438(2)=
                                                      3472(2)=  3481(2)=  3507      3582(2)   3592
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17-0000DAAC  R*4  WVDATS              COMM      2400  (600)          1544
 2-000189A0  R*4  WVDDC                         2400  (600)          1581       3420=      3440(2)=
                                                    3474(2)=  3483(2)=  3508    3585(2)    3592

 5-0004E1B0  R*4  WVDDTS              COMM      2400  (600)           830
16-00069124  R*4  XAEEFF              COMM       960  (8, 15, 2)     1422
16-000694E4  R*4  XAEEFP              COMM       960  (8, 15, 2)     1423
16-000698A4  R*4  XAEEFS              COMM       640  (8, 10, 2)     1424
16-00069B24  R*4  XAEEFT              COMM       960  (8, 15, 2)     1425

 5-0004EB10  R*4  XAEF                COMM       128  (8, 4)          831       3498A
13-00070DDC  R*4  XAERTA              COMM      1472  (8, 23, 2)     1236
13-0007139C  R*4  XAERTD              COMM      1472  (8, 23, 2)     1237
 5-0004EB90  R*4  XDEF                COMM       128  (8, 4)          832       3502A
13-0007195C  R*4  XFMF                COMM        32  (8)            1238

17-0000E40C  R*4  XFRNTG              COMM        64  (8, 2)         1545
16-00069EE4  R*4  XHEEFF              COMM       960  (8, 15, 2)     1426
16-0006A2A4  R*4  XHEEFP              COMM       960  (8, 15, 2)     1427
16-0006A664  R*4  XHEEFS              COMM       640  (8, 10, 2)     1428
16-0006A8E4  R*4  XHEEFT              COMM       960  (8, 15, 2)     1429

 2-00019300  R*4  XMKGS                         1104  (6, 23, 2)     1581       4001=      4003
                                                    4043=     4045      4070(2)=  4071       4107=
                                                    4109      4130=     4132      4162(2)=   4236
                                                    4425A

 3-00012BB4  R*4  XOCCDU              COMM        64  (8, 2)          334
 5-0004EC10  R*4  XOCDP               COMM        64  (8, 2)          833
17-0000E44C  R*4  XOCTCD              COMM        64  (8, 2)         1546
13-0007197C  R*4  XPCAF               COMM        64  (8, 2)         1239       3865A
13-000719BC  R*4  XPCDF               COMM        64  (8, 2)         1240       3874A

 5-0004EC50  R*4  XSEFF               COMM       640  (8, 10, 2)      834       3542A
13-000719FC  R*4  XTGEF               COMM        32  (8)            1241
 5-0004EED0  R*4  XWAEF               COMM       128  (8, 4)          835       3510A
 5-0004EF50  R*4  XWDEF               COMM       128  (8, 4)          836       3514A
16-0006ACA4  R*4  YAEEFF              COMM       960  (8, 15, 2)     1430

16-0006B064  R*4  YAEEFP              COMM       960  (8, 15, 2)     1431
16-0006B424  R*4  YAEEFS              COMM       640  (8, 10, 2)     1432
16-0006B6A4  R*4  YAEEFT              COMM       960  (8, 15, 2)     1433
 5-0004EFD0  R*4  YAEF                COMM       128  (8, 4)          837       3498A
13-00071A1C  R*4  YAERTA              COMM      1472  (8, 23, 2)     1242

13-00071FDC  R*4  YAERTD              COMM      1472  (8, 23, 2)     1243
 5-0004F050  R*4  YDEF                COMM       128  (8, 4)          838       3502A
13-0007259C  R*4  YFMF                COMM       768  (8, 6, 4)      1244
17-0000E48C  R*4  YFRNTG              COMM        64  (8, 2)         1547
16-0006BA64  R*4  YHEEFF              COMM       960  (8, 15, 2)     1434

16-0006BE24  R*4  YHEEFP              COMM       960  (8, 15, 2)     1435
16-0006C1E4  R*4  YHEEFS              COMM       640  (8, 10, 2)     1436
16-0006C464  R*4  YHEEFT              COMM       960  (8, 15, 2)     1437
 3-00012BF4  R*4  YOCCDU              COMM        64  (8, 2)          335
 5-0004F0D0  R*4  YOCDP               COMM        64  (8, 2)          839
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17-0000E4CC  R*4  YOCTCD              COMM        64  (8, 2)          1548
13-0007289C  R*4  YPCAF               COMM       384  (6, 8, 2)       1245     3855
13-00072A1C  R*4  YPCDF               COMM       384  (6, 8, 2)       1246     3858
 5-0004F110  R*4  YSEFF               COMM       640  (8, 10, 2)       840     3542A
13-00072B9C  R*4  YTGEF               COMM       160  (8, 5)          1247

 5-0004F390  R*4  YWAEF               COMM       128  (8, 4)           841     3510A
 5-0004F410  R*4  YWDEF               COMM       128  (8, 4)           842     3514A


PARAMETER CONSTANTS

 Type  Name                                 References

 R*4  ACTIVE                                   81#
 R*4  ASSEMBLY                                 73#
 R*4  BACK                                     79#
 R*4  BARRIER                                  75#
 R*4  COMBAT                                   72#

 R*4  DELUNT                                   76#
 R*4  FORWARD                                  78#
 I*4  INACT1                                   82#
 I*4  INACT2                                   83#
 I*4  LNAAC                                    89#     208     541     542     754     806
                                              988     1530

 I*4  LNAACS                                  208#
 I*4  LNAB                                     90#     209     289     292     293     300
                                              597     779     901     940     994
 I*4  LNABR                                    91#
 I*4  LNABT                                   209#     681
 I*4  LNABTRG                                  92#     276     285

 I*4  LNAC                                     93#     210     212     214     255     258
                                              261     275     276     277     279     283
                                              301     302     305     308     312     314
                                              316     317     321     342     343     344
                                              345     346     347     348     349     350
                                              351     352     353     354     355     356
                                              357     358     359     360     361     362
                                              363     364     365     366     367     368
                                              369     370     371     372     373     374
                                              375     376     377     378     379     380
                                              381     382     383     384     385     386
                                              387     388     389     393     394     395
                                              396     397     398     399     400     401
                                              414     418     419     420     421     422
                                              423     424     425     426     427     428
                                              429     430     431     432     433     434
                                              435     436     437     438     439     440
                                              441     442     443     444     445     446
                                              447     448     449     450     451     452
                                              453     454     455     456     457     458
                                              459     460     461     486     487     488
                                              489     490     493     494     495     496
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                        497      498      499      500      501      502
                        503      504      505      506      507      508
                        509      510      511      512      513      514
                        515      516      517      518      546      557
                        560      562      564      662      664      767
                        855      856      857      858      859      860
                        861      865      866      867      868      869
                        912      913      914      934      970      989
                       1085     1086     1102     1103     1104     1105
                       1106     1107     1130     1131     1132     1133
                       1134     1135     1136     1137     1138     1139
                       1140     1141     1142     1143     1144     1146
                       1147     1148     1150     1151     1152     1228
                       1277     1278     1555     1561     1562
I*4  LNACSQ             210#     491      492      519      520
I*4  LNACT2             211#
I*4  LNACTT              94#     211      767
I*4  LNADDR             212#    1555     1568

I*4  LNAFAC              95#     990
I*4  LNAFS               96#     991
I*4  LNAGDM             213#
I*4  LNAGIN              97#
I*4  LNAGPR              98#

I*4  LNAGT               99#     213      999
I*4  LNALOC             100#
I*4  LNAM               101#     264      265      266      267      268
                        298      306      307      325      330      332
                        791      820      855      992     1085     1086
                       1223     1224     1232     1233     1454     1501
                       1552(2)  1594(2)
I*4  LNAPOD             102#     258      259      549      558      995
                       1294     1295     1296     1297     1298     1299
                       1300     1301     1302     1303     1304     1305
                       1307     1407     1408
I*4  LNARCT             103#

I*4  LNAREA             104#
I*4  LNAS               105#     993
I*4  LNAXAM             214#     341      402      403      404
I*4  LNBA               106#     215      638      761     1199     1200
I*4  LNBANS             215#     551

I*4  LNCDPD             107#
I*4  LNCHA              108#     243
I*4  LNCHFM             109#
I*4  LNCHW              110#     216     1007
I*4  LNCHWD             216#

I*4  LNCKP              111#    1455     1458     1465     1466     1488
I*4  LNCLOC             217#
I*4  LNCMS              112#
I*4  LNCOV              113#
I*4  LNCP               114#    1337     1339     1341

I*4  LNCSPT             218#
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I*4  LNCTGT     115#
I*4  LNCUS      116#   1303   1309   1326     1377   1395
I*4  LNCWR      117#    219
I*4  LNCWRD     219#

I*4  LND        118#    220    552    553      554    555
                556     605    623    625      641    675
                677     717    746    783      793    813
                814     830    863    873      874    877
                879     902    903    904      935   1030
               1089    1231   1265   1492     1494   1495
               1498    1499   1506   1507     1544   1557
               1558    1559   1563   1564     1566   1569
               1573    1574   1577   1578(2)  1579   1580
               1581    4626
I*4  LNDELT     119#    813    903
I*4  LNDMT      120#    243
I*4  LNDPCS     121#    224    996   1311     1313   1315
               1316    1317   1318   1319     1382   1404
I*4  LNDPCZ     122#

I*4  LNDPDS     123#    225    997   1314     1320   1321
               1322    1323   1324   1328     1383   1405
I*4  LNDS       124#    606    607    880      881    882
                883     884    885    969      972
I*4  LNDSM      125#    213   1000
I*4  LNDSMS     126#
I*4  LNDT       220#    683

I*4  LNDVT      127#
I*4  LNEML      128#    221
I*4  LNEMLD     221#
I*4  LNEMSC     129#
I*4  LNESC      130#    222   1489

I*4  LNESCD     222#
I*4  LNEVNT     131#
I*4  LNFCT      132#    230    240    267      269    566
                567     568    569    608      609    610
                611     612    613    614      615    616
                617     618    619    626      630    633
                756     757    766    786      787    791
                792     820    821    998     1308   1312
               1330    1336   1346   1350     1366   1370
               1421    1422   1423   1425     1426   1427
               1429    1430   1431   1433     1434   1435
               1437    1469   1470   1471     1472
I*4  LNGR       133#   1097   1260
I*4  LNGS       134#   1004

I*4  LNGWT      135#    325    326   1005     1094   1100
               1171    1172   1221   1222     1223   1224
               1225    1226   1596   1677     1697   1718
               2023
I*4  LNIAF      136#
I*4  LNIC       137#    223    236    572      574    575
                576     577    578    579      580    589
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                     590     598     599     600     601     602
                     633     650     726     727     751     752
                     768     771     785     789     805     825
                     826     828     831     832     835     836
                     837     838     841     842     870     871
                     872    1191    1247    1329    1344(2) 1345(2)
                    1354    1355    1356    1357    1361    1362
                    1363    1364    1379    1388    1389    1390
                    1391    1392    1417    1418    1485    1517
                    1520    1521    1522    1529
I*4   LNIC2          223#
I*4   LNIDT          138#    573     588     591     620     748
                     755     815     816     817     818     819
                     829    1003    1173    1175    1190    1197
                    1468    1474    1475    1497    1514    1543

I*4   LNIFCT         139#   1031    1293    1333    1347    1348
                    1349    1369    1399    1413    1416
I*4   LNINTS         140#    691    1457    1509
I*4   LNITBL         141#    698     710
I*4   LNITM          142#
I*4   LNIWZ          143#

I*4   LNKAS          144#
I*4   LNKWPS         145#
I*4   LNKWS          146#
I*4   LNLDPC         224#   1309
I*4   LNLDPD         225#   1326

I*4   LNLIMT         147#    855
I*4   LNLNFC         148#    334     335     831     832     833
                     834     835     836     837     838     839
                     840     841     842    1236    1237    1238
                    1239    1240    1241    1242    1243    1244
                    1245    1246    1247    1422    1423    1424
                    1425    1426    1427    1428    1429    1430
                    1431    1432    1433    1434    1435    1436
                    1437    1545    1546    1547    1548    1572
                    1573
I*4   LNLOC          149#    226
I*4   LNLOCS         226#    970
I*4   LNLPRT         227#   1377

I*4   LNLSDN         150#
I*4   LNLSN          228#   1395
I*4   LNLSPG         229#
I*4   LNMAX2         230#
I*4   LNMAX3         151#

I*4   LNMD           152#
I*4   LNMM           153#    269     270     271     272     273
                     299     309     310     326     329     331
                     333     792     802     821    1225    1226
                    1234    1235    1553(2) 1595(2)
I*4   LNNUFM         154#
I*4   LNNUW          155#    231     246    1010
I*4   LNNUWD         231#
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I*4	LNOPCLS	156#					
I*4	LNPCH	157#					
I*4	LNPNU	158#					
I*4	LNPORT	159#	227	260	291	312	313
		559	669	765	772	773	774
		775	1002	1367	1368	1372	1375
		1376	1379	1381	1384	1386	1387
		1400	1401	1402	1403	1409	1410
		1527					
I*4	LNPP	160#					
I*4	LNPPM	161#	630	1338	1340	1342	
I*4	LNPSCT	162#					
I*4	LNPTP	163#	588	794	795	798	1011
		1168	1170	1171	1172	1173	1178
		1179	1190	1192	1193	1194	1195
		1196	1197	1198	1218	1220	1221
		1222	1244	1245	1246	1604(2)	1679
		1688	1699	1708	2171		
I*4	LNQRAT	164#	281	290	581	582	583
		584	585	586	663	779	
I*4	LNR	165#	232	234	342	343	344
		345	346	347	348	349	350
		351	352	353	354	355	356
		357	358	359	360	361	362
		363	364	365	366	367	368
		369	370	371	372	373	374
		375	376	377	378	379	380
		381	382	383	384	385	386
		387	388	389	393	394	396
		397	399	400	405	406	407
		408	409	410	411	412	413
		415	416	417	418	419	420
		421	422	423	424	425	426
		427	428	429	430	431	432
		433	434	435	440	441	442
		443	444	445	446	447	448
		453	454	455	456	457	458
		459	460	461	474	475	476
		480	481	482	483	484	485
		543	544	545	912	913	914
		1102	1103	1104	1105	1106	1107
I*4	LNRBST	166#					
I*4	LNRD	232#	446	447	448		
I*4	LNRIC	167#					
I*4	LNRNCLS	168#					
I*4	LNRP	169#	281				
I*4	LNRS	170#	233				
I*4	LNRSM	233#					
I*4	LNRT	234#	629	637	729	733	
I*4	LNRWC	171#					
I*4	LNS	172#	215	235	236	239(2)	390
		391	392	395	398	401	414
		471	477	524	541	542	566

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                     567      568      569      574      575      576
                     577      578      579      580      595      596
                     599      600      601      602      608      609
                     610      612      613      614      615      617
                     618      619      624      633      636      645
                     651      652      654      667      691      703
                     764      770      781      789      801      826
                     862      864      870      871      872      875
                     876      880      881      882      883      884
                     885      886      887      888      889      890
                     895      896      897      898      899      900
                     905      911      915      919      920      921
                     922      923      924      934      968      970
                     971      973      974      1085     1086     1088
                     1090     1091     1093     1109     1110     1119
                     1120     1129     1130     1131     1132     1133
                     1134     1135     1136     1137     1138     1139
                     1140     1141     1142     1143     1144     1145
                     1146     1147     1148     1149     1150     1151
                     1152     1153     1154     1155     1264     1273
                     1274     1277     1278     1279     1280     1281
                     1388     1390     1391     1392     1417     1418
                     1455     1456     1457     1458     1459     1460
                     1465     1466     1478     1487     1488     1490
                     1491     1500     1509     1511     1512     1516
                     1520     1522     1531     1532     1533     1556
                     1559     1563     1564     1566     1570     1571
                     1574     1575     1579     1605(2)  1606(2)  1662
                     1663     1664

I*4  LNSBT           173#
I*4  LNSCYC          174#     217      218
I*4  LNSD            235#     317      318      634
I*4  LNSHCLS         175#     307      310
I*4  LNSHT           176#

I*4  LNSIC           236#
I*4  LNSIDE          177#     226      258      259      260      276
                     280      281      282      285      291      295
                     296      297      298      299      303      306
                     307      309      310      312      313      316
                     319      320      329      549      558      559
                     636      766      787      796      808      811
                     1088     1109     1110     1236     1237     1242
                     1243     1277     1278     1279     1280     1419
                     1420     1513     1531     1545     1547
I*4  LNSM            178#     415      416      417      917
I*4  LNSMMX          237#
I*4  LNSMN           179#     1006     1098     1099     1129     1153
                     1165     1166     1167     1169     1215     1216
                     1217     1219     1256     1257     1264     1273
                     1583(2)  1585(2)  1586(2)  1587     1588     1590(2)
                     1592(2)  1597(2)  1598(2)  1599(2)  1600(2)  1601(2)
                     1602(2)  1603(2)  4174     4175

I*4  LNSMTT          180#     595      596      1647
I*4  LNSN            181#     228      238      656      769      799
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                1398    1406    1411    1412    1461
I*4  LNSNP       238#
I*4  LNSPT       182#    218     263     274     275     282
                 587     588     589     590     591     592
                 597     598     621     755     793     805
                 834     840    1173    1228    1229    1230
                1293    1297    1298    1299    1300    1301
                1302    1306    1312    1325    1329    1330
                1331    1332    1336    1343    1344    1345
                1352    1375    1376    1399    1400    1401
                1402    1403    1407    1408    1409    1410
                1411    1412    1424    1428    1432    1436
                1474    1475    1482    1571(2)
I*4  LNSPTG      183#    229     772    1294    1305    1372
                1414

I*4  LNSS        184#    237     323     471     472     473
                 474     475     476     477     478     479
                 480     481     482     483     484     485
                 548     593     594     918    1013
I*4  LNSSL       185#    322     405     406     407     408
                 409     410     411     412     413     543
                 544     545     547     570     571     605
                 916    1009
I*4  LNSSM       186#    208     214     237     240     256
                 259     274     284     285     304(2)  305
                 308     311(2)  313     315     318     319
                 329     550     561     563     565     595
                 596     634     635     636     670     671
                 672     719     762     764     770     801
                 802     803     804     968     971     973
                1014    1154    1229    1279    1280    1565(2)
                1570    1581    1662    1663    1664    4425
I*4  LNSSPT      239#
I*4  LNSU        187#    240     631     650     746     748
                 776     777     782     807     810     816
                 819     969     972    1015    1468

I*4  LNSUB       188#
I*4  LNSVST      189#
I*4  LNTART      240#
I*4  LNTBLS      190#    659     661     685     686     687
                 688     692     693     694     695     696
                 697     699     700     701     704     705
                 706     707     708     709     711     712
                 713
I*4  LNTC        191#    651     652

I*4  LNTERD      241#
I*4  LNTERT      192#    242    1008    1190    1196    1197
                1198    1244    1350    1479    1497
I*4  LNTGT       193#
I*4  LNTGTAB     194#
I*4  LNTR        195#    241     632

I*4  LNTRK       196#   1304    1311    1328    1381    1397
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    I*4  LNTRTD                      242#
    I*4  LNTYP                       197#
    I*4  LNVARQ                      198#
    I*4  LNW                         199#     212(2)   230      266      268      272
                                     273      286      332      333      556      572
                                     599      600      601      602      637      716
                                     818      822      823      825      826      828
                                     870      871      872      891      904      1017
                                     1087(2)  1094     1095     1109     1110     1119
                                     1120     1139     1149(2)  1153     1154     1155
                                     1165(2)  1166(2)  1167(2)  1168(2)  1169(2)  1170(2)
                                     1171     1172     1177     1178     1179     1206
                                     1212     1213     1214     1215(2)  1216(2)  1217(2)
                                     1218(2)  1219(2)  1220(2)  1221     1222     1230
                                     1232     1233     1234     1235     1236     1237
                                     1242     1243     1256     1257     1262     1263
                                     1273(2)  1282     1283     1388     1389     1390
                                     1391     1416     1417     1418     1481     1484
                                     1485     1517     1521     1522     1528     1529
                                     1540     1541     1552(2)  1553(2)  1554(4)  1555
                                     1556     1557     1558     1560(2)  1561     1562
                                     1565(2)  1567(4)  1570     1576(4)  1579     1580
                                     1581     1583(4)  1584(4)  1585(4)  1586     1587(2)
                                     1588(2)  1589(4)  1590(4)  1591(4)  1592(4)  1593(4)
                                     1594(2)  1595(2)  1602(4)  1603(4)  1604(2)  1605(2)
                                     1606(2)  1607(2)  1608(2)  4172(2)  4173     4174(2)
                                     4175     4224     4225     4226     4425

    I*4  LNWAD                       243#
    I*4  LNWCC                       200#     244      1007
    I*4  LNWCCD                      244#
    I*4  LNWCN                       201#     245      246      1010
    I*4  LNWCND                      245#

    I*4  LNWORD                      202#     1005
    I*4  LNWPC                       203#     1095     1101     1880     3465
    I*4  LNWSU                       204#     650      819
    I*4  LNYLD                       205#     246
    I*4  LNYLDS                      246#

    I*4  LNZ                         206#     240      632      777      778      809
                                     812      969      972

    I*4  LOCATION                    86#
    I*4  MARCH                       77#
    R*4  REAR                        84#
    R*4  STATUS                      87#

    R*4  WAIT                        74#

LABELS

   Address     Label                References

  1-000000CA   1'                    1781     1782#
  1-00000C3E   10'                   1785     3590     3770     4729#
  1-00000C45   21'                   4495     4730#
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                       3244    3247    3389    3391    3393    3395
                       3592    3597    3604    3637    3639    3768
                       3802    3888    3890    3941    4381    4383
                       4399    4408    4418    4422    4483    4563
                       4731#
1-000006FB  23'        3368    3369#   3384

1-00000C57  100'       3224    4732#
1-00000C94  101'       3227    4734#
1-00000CD1  102'       3230    4736#
1-00000D0E  103'       3233    4738#
    **      104'       4740#

1-00000D4B  105'       3216    4741#
1-00000D62  106'       3365    4742#
1-00000D86  107'       3382    4743#
1-00000DAB  108'       3388    4744#
1-00000DCC  109'       3390    4745#

1-00000DEE  110'       3589    4746#
1-00000E0C  111'       3591    4747#
1-00000E87  112'       3596    4750#
1-00000EA7  113'       3603    4751#
1-00000ED3  114'       3636    4752#

1-00000EFF  115'       3767    4753#
1-00000F0F  116'       3801    4754#
1-00000F23  117'       3887    4755#
1-00000F3F  118'       3889    4756#
    **      119'       4757#

    **      120'       4758#
1-00000F6B  121'       4398    4759#
1-00000F94  122'       4407    4760#
1-00000FCB  123'       4380    4761#
1-00000FF6  124'       4416    4762#

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1-00001051  126'       4488    4764#
1-000010A5  127'       4382    4766#
1-000010DD  128'       3940    4767#
1-000010F5  129'       4482    4768#

1-00001113  130'       4558    4769#
1-00001124  131'       1784    4770#
1-0000113D  132'       3769    4771#
1-0000114C  135'       3638    4772#
1-00001178  140'       3236    4773#

1-000011C1  141'       3239    4775#
1-0000120A  142'       3242    4777#
1-00001253  143'       3245    4779#
1-0000129C  144'       3392    4781#
1-000012C3  145'       3394    4782#

1-000006ED  146'       3366    3367#   3383
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0-0000028F  230     1648   1659#
0-00000297  240     1646   1660#
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0-00000833  500     1764   1779#
0-00000776  505     1757   1762#
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                    2904
1-000001FA  603'    2743   2745#
1-00000250  606'    2756   2757#
0-00003325  607     2761#
1-000002B1  609'    2765   2766#

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1-00000478  615'    2851   2852#
1-00000305  618'    2773   2774#
1-00000355  621'    2781   2782#
1-000003A5  623'    2793   2794#   2819   2863   2888

1-000003A9  624'    2803   2805#
1-000003E7  627'    2830   2832#
1-00000731  630'    4186   4187#
0-00009F49  631     4191   4192#
1-0000077C  632'    4192   4193#

1-00000784  633'    4194   4195#
0-0000A00B  634     4197   4198#
1-000007BE  635'    4198   4199#
0-0000A095  636     4185   4200#
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1-00000145  1007'   1987   1988#

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1-000005D2  1014'   3108   3109#

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1-00000672  1017'   3289   3290#
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0-00001C61  1027    2161   2163#
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0-0000545E	1550	3120	3214#	
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0-00005B83	2015	3268	3269	3274#
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0-00005F1D	2035	3323	3326#	
0-00005F9A	2040	3328	3329	3333#
0-0000603F	2050	3336	3339#	
0-000060B7	2060	3341	3342	3346#
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0-0000759D	3010	3613	3616#	

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0-00008438  4512          3857     3859#
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0-00008B53  6006          3964     3967#
0-00008BAA  6007          3968     3971#

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0-0000931B  6044          4026     4048#

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0-0000A279  6054          4232     4234#
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0-0000AAA7  6510      4338   4343   4376#

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0-0000BB34  8025      4592   4594#
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 0-0000C3A0  8550                      4678    4701#
 1-00000708  9000'                     3618    3619#

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FUNCTIONS AND SUBROUTINES REFERENCED

```
 Type  Name                           References

       ADJUST                         4172    4173    4174    4175
       CVFW                           3498    3502    3510    3514    3542    3865
                                      3874
       DEBUG                          1662    1663    1664    4224    4225    4226
                                      4425    4607
       EIGENV                         3265    3275
 I*4   ISAT                           1803    2923    3645    3757

       MPROD                          3308    3309    3321    3322    3334    3335
                                      3347    3348
```

```
+-------------------------------------------------+
|          KEY TO REFERENCE FLAGS                 |
|    =    - Value Modified                        |
|    #    - Defining Reference                    |
|    A    - Actual Argument, possibly modified    |
|    D    - Data Initialization                   |
|   (n)   - Number of occurrences on line         |
+-------------------------------------------------+
```

```
COMMAND QUALIFIERS

  FOR/NOLIST/NOOPT/OBJECT=C315:[CILLO.TACWAR30.IDA]GC.OBJ/CROSS/LIS=C315:[CILLO.TACWAR30.IDA]GC.LIS C315:[CILLO.TACWAR30.I

  /CHECK=(NOBOUNDS,OVERFLOW,NOUNDERFLOW)
  /DEBUG=(NOSYMBOLS,TRACEBACK)
  /SHOW=(NODICTIONARY,NOINCLUDE,MAP,NOPREPROCESSOR,SINGLE)
  /STANDARD=(NOSEMANTIC,NOSOURCE_FORM,NOSYNTAX)
  /WARNINGS=(NODECLARATIONS,GENERAL,NOULTRIX,NOVAXELN)
  /CONTINUATIONS=19  /CROSS_REFERENCE  /NOD_LINES  /NOEXTEND_SOURCE
  /F77  /NOG_FLOATING  /I4  /NOMACHINE_CODE  /NOOPTIMIZE  /NOPARALLEL
  /NOANALYSIS_DATA
  /NODIAGNOSTICS
  /LIST=C315:[CILLO.TACWAR30.IDA]GC.LIS;1
  /OBJECT=C315:[CILLO.TACWAR30.IDA]GC.OBJ;1


COMPILATION STATISTICS

  Run Time:          97.61 seconds
  Elapsed Time:      209.49 seconds
  Page Faults:       11286
  Dynamic Memory:    5617 pages
```

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